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Nuclear Plant Reliability Data System 1980 Annual Reports of Cumulative System and Component Reliability

Prepared by
Southwest Research Institute

Prepared for
American Public Power Association
Edison Electric Institute
Tennessee Valley Authority
U.S. Nuclear Regulatory Commission

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Nuclear Plant Reliability Data System 1980 Annual Reports of Cumulative System and Component Reliability

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Prepared for
American Public Power Association
Edison Electric Institute
Tennessee Valley Authority
U.S. Nuclear Regulatory Commission

NUCLEAR PLANT RELIABILITY DATA SYSTEM 1980 ANNUAL REPORTS OF CUMULATIVE SYSTEM AND COMPONENT RELIABILITY

Prepared by

Southwest Research Institute
San Antonio, TX 78284

Under the Direction of the ANS-58.20 Subcommittee of the ANS-4 Management Committee, a Division of the American Nuclear Society's Nuclear Power Plants Standards Committee (NUPPSCO)

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ACKNOWLEDGMENTS

The ANS-58.20 Subcommittee of the ANS-4 Management Committee expresses appreciation to the Utility participants who have contributed large amounts of their time in preparing the input data for this system. Constructive comments in all areas of the NPRDS have been received from representatives of Utilities, reactor manufacturers, architect-engineers, Nuclear Regulatory Commission, Electric Power Research Institute, Nuclear Safety Analysis Center, Institute of Nuclear Power Operations, industry societies, and other interested groups. These comments are greatly appreciated.

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PREFACE

These Nuclear Plant Reliability Data System (NPRDS) annual reports were designed to serve as a source of reliability and failure statistics for operators, designers, manufacturers, architect-engineers, constructors, and regulators of safety-related systems and components. To achieve this end, statistics have been grouped and combined across various categories and presented as such separately for each system and component category in this report. The annual reports are an outgrowth of some six years of data collection experience on commercially operated U.S. nuclear power plants, and were initiated to serve the needs of the users in their application of operating data experience.

The primary purposes of the information in these reports are the following:

(1) To provide operating statistics of safety-related systems within a unit which may be used to compare and evaluate reliability performance and

(2) To provide failure mode and failure rate statistics on components which may be used in failure mode effects analysis, fault hazard analysis, probalistic reliability analysis, and so forth.

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INTRODUCTION

This volume is the sixth annual report to be issued for the NPRDS. As reflected in the "Status of NPRD Reports in the Data Base" on page 3 and in the "Cumulative NPRD Reports Submitted by Year" on page 5, progress has continued during 1980 in reporting by Utility participants. The data base is, therefore, reasonably mature and can provide meaningful statistics.

This NPRDS Document includes two types of annual reports:

(1) Annual Report of Cumulative System Reliability (A02)

(2) Annual Report of Cumulative Component Reliability (A03)

Both annual reports provide generic reliability information on systems and components for the cumulative period from July 1974 to December 1980. The analytical technique used in the A03 report presents data in a form which permits a Utility to compare the performance of its components with others. That is, individual failure rates for components for each unit (plant) are calculated and reported to each utility separately in its own unique annual report [Annual Report of Cumulative Component Reliability by Individual Reporting Organization (A05)]. For that reason, this report presents statistics of individual failure rates rather than pooling failure rates over all units. However, it will be possible to compute pooled estimates from the information provided, if anyone wishes to do so. Individual computation is done deliberately (in preference to estimating an average failure rate) so that an assessment can be made of high, low, or average values as compared with others in the data base. Copies of the A05 reports are also issued to participating sister Utilities (same reactor manufacturers), reactor manufacturers, architect-engineers, and the Nuclear Regulatory Commission for comparative purposes. Appendix A provides definitions for each report element in the annual report.

Quarterly Reports - These reports have been issued to the participating Utilities, reactor manufacturers, architect-engineers, and the Nuclear Regulatory Commission since July 1974 when the system was implemented for all units in commercial operation in the United States. The major objectives of the quarterly reports are to provide an up-to-date microfiche copy of engineering data for each unit participating and printouts of all failures reported on all units. Failure report summaries are also provided by type of component for each manufacturer, based on population, failures during the quarter, failure cause, and total failures to date.

Special Reports - In addition to the routine annual and quarterly reports, special reports are prepared to satisfy requests made by interested groups. A capability has also been implemented to permit direct access of the data base using remote computer terminals for additional ad hoc report generation, specific data analysis, and improved timeliness.

Additional NPRD program publications that may be of interest to those using these annual reports are:

NPRDS Newsletter - The newsletter is published quarterly and contains current information on the NPRDS program status, recent and planned changes, announcements, and special reports processed. There is no charge for the newsletter.

NPRD System Description - This paper is updated annually to give a brief description of how NPRDS works and what NPRDS does for the nuclear industry. There is no charge for the paper.

NPRDS Reporting Procedures Manual - This manual provides complete instructions for participants in the NPRDS. Controlled copies are $50 and are kept up to date for participants. Uncontrolled copies are $15 and are current when purchased, but are not updated. Either version of the manual may be purchased by calling or writing the NPRDS Coordinator.

The NPRDS is the source from which failure and failure rate statistics are derived on selected systems and components related to nuclear safety in nuclear power plants. The systems and components included in the NPRDS data base are, in general, those classified as Safety Classes 1 and 2 in ANSI 18.2 and ANSI/ANS 52.1, and Class 1E in IEEE-308. Excluded from the data base are spent fuel storage, passive reactor vessel structural internals, PWR piping 1 inch and below, and BWR piping 1-1/4 inches and below. Approximately 4,000 components within 25 to 35 systems are included in the reportable scope for each unit. The participating Utility supplies engineering data for each reportable component and system. These engineering data, in coded form, are entered in the data base and are available as parameters on which to sort and select components for specific analyses. In order to compute the components or system operating hours, the engineering data report includes estimates of operating time as related to reactor operating hours at three different conditions: (1) Critical, (2) Standby, and (3) Shutdown. It is assumed that these three operating conditions will account for 100 percent of total operating time. Actual operating times as reported on the Quarterly Operating Reports are used to compute the estimated operating hours for each system and component in the NPRDS data base. Each participating Utility reports equipment-related failures of a reportable system or component in considerable detail.

TABLE 1

STATUS OF NPRDS REPORTS IN THE DATA BASE AS OF:

December 31, 1980

TABLE 1

STATUS OF NPRDS REPORTS IN THE DATA BASE AS OF:

December 31, 1980

UTILITY	PLANT-UNIT	COMM. DATE	THERMAL RATING MW	ELECTRICAL RATING MW (GROSS)	SYSTEM/COMPONENT ENGINEERING REPORTS (NPRD-2) TOTAL	QUARTERLY OPERATING REPORTS (NPRD-3) TOTAL	SYSTEM/COMPONENT FAILURE REPORTS (NPRD-4) TOTAL
1. ALABAMA POWER COMPANY	(1) Joseph M. Farley 1	12/77	2652	860	33/ 3104	9	0/ 0
2. ARKANSAS POWER & LIGHT COMPANY	(2) Arkansas Nuclear 1	12/74	2568	833	26/ 3252	24	6/ 337
	(3) Arkansas Nuclear 2	3/80	2815	889	15/ 1827	4	0/ 4
3. BOSTON EDISON COMPANY	(4) Pilgrim 1	12/72	1998	680	27/ 1900	26	2/ 75
4. BALTIMORE GAS & ELECTRIC COMPANY	(5) Calvert Cliffs 1	5/75	2700	845	26/ 4988	22	1/ 239
	(6) Calvert Cliffs 2	4/77	2700	860	20/ 4263	14	0/ 111
5. CONSOLIDATED EDISON COMPANY	(7) Indian Point 2	8/73	2758	900	26/ 3681	26	0/ 222
6. CONSUMERS POWER COMPANY	(8) Palisades 1	12/71	2530	675	24/ 1937	26	3/ 219
7. CAROLINA POWER & LIGHT COMPANY	(9) Brunswick 1	3/77	2436	813	36/ 3458	16	9/ 138
	(10) Brunswick 2	11/75	2436	813	37/ 3630	21	4/ 271
	(11) H.B. Robinson 2	3/71	2300	700	21/ 3170	26	2/ 230
8. COMMONWEALTH EDISON COMPANY	(12) Dresden 2	6/72	2527	812	33/ 3554	26	6/ 202
	(13) Dresden 3	11/71	2527	812	32/ 3354	26	2/ 163
	(14) Quad Cities 1	2/73	2511	813	37/ 2626	30	5/ 358
	(15) Quad Cities 2	3/73	2511	813	33/ 2434	26	1/ 156
	(16) Zion 1	12/73	3250	1085	24/ 2598	26	3/ 189
	(17) Zion 2	9/74	3250	1085	24/ 2548	26	0/ 191
9. CONNECTICUT YANKEE ATOMIC POWER CO.	(18) Haddam Neck 1	1/68	1825	577	19/ 2359	26	2/ 189
10. DUQUESNE LIGHT COMPANY	(19) Beaver Valley 1	10/76	2652	845	20/ 3212	17	1/ 165
11. DUKE POWER COMPANY	(20) Oconee 1	7/73	2568	899	19/ 1871	30	1/ 113
	(21) Oconee 2	9/74	2568	899	25/ 1691	26	2/ 113
	(22) Oconee 3	12/74	2568	899	23/ 1733	25	0/ 109
12. FLORIDA POWER CORPORATION	(23) Crystal River 3	3/77	2452	821	24/ 5266	16	0/ 128
13. FLORIDA POWER & LIGHT COMPANY	(24) St. Lucie 1	12/76	2560	822	28/ 1218	17	0/ 2
	(25) Turkey Point 3	12/72	2300	700	29/ 1576	26	3/ 26
	(26) Turkey Point 4	9/73	2200	700	28/ 1540	26	3/ 25
14. GEORGIA POWER COMPANY	(27) Edwin I. Hatch 1	12/75	2436	797	10/ 1508	6	0/ 105
15. INDIANA & MICHIGAN POWER CO.	(28) D.C. Cook 1	8/75	3250	1090	13/ 1493	22	0/ 78
	(29) D.C. Cook 2	7/78	3391	1118	7/ 1316	10	0/ 0
16. JERSEY CENTRAL POWER & LIGHT CO.	(30) Oyster Creek 1	12/69	1930	650	28/ 3381	21	6/ 92
17. METROPOLITAN EDISON COMPANY	(31) Three Mile Island 1	9/74	2535	840	18/ 1425	24	0/ 39
	(32) Three Mile Island 2	12/78	2772	0	0/ 1190	8	0/ 2
18. MAINE YANKEE ATOMIC POWER CO.	(33) Maine Yankee 1	12/72	2630	850	28/ 2816	30	0/ 178
19. NIAGARA MOHAWK POWER CORPORATION	(34) Nine Mile Point 1	12/69	1850	630	26/ 1806	24	0/ 255
20. NORTHEAST NUCLEAR ENERGY COMPANY	(35) Millstone 1	3/71	2011	686	25/ 3816	26	3/ 172
	(36) Millstone 2	12/75	2700	895	26/ 3440	21	2/ 216
21. NEBRASKA PUBLIC POWER DISTRICT	(37) Cooper 1	7/74	2381	787	4/ 6	22	0/ 6
22. NORTHERN STATES POWER COMPANY	(38) Monticello 1	6/71	1670	564	22/ 2776	26	5/ 364
	(39) Prairie Island 1	12/73	1650	534	25/ 2817	26	3/ 146
	(40) Prairie Island 2	12/74	1650	531	25/ 2713	25	0/ 139
23. OMAHA PUBLIC POWER DISTRICT	(41) Ft. Calhoun 1	9/73	1420	481	12/ 3132	0	0/ 0
24. PHILADELPHIA ELECTRIC COMPANY	(42) Peach Bottom 2	7/74	3293	1098	40/ 3474	26	0/ 29
	(43) Peach Bottom 3	12/74	3293	1098	38/ 2181	25	0/ 12
25. PUBLIC SERVICE ELECTRIC & GAS CO.	(44) Salem 1	6/77	3338	1134	30/ 4243	13	0/ 146
26. PORTLAND GENERAL ELECTRIC COMPANY	(45) Trojan 1	5/76	3411	1132	38/ 4392	19	1/ 75
27. POWER AUTHORITY OF THE STATE OF NEW YORK	(46) Indian Point 3	8/76	3025	1000	26/ 3664	17	1/ 57
	(47) Fitzpatrick 1	7/75	2436	830	22/ 5271	22	0/ 0
28. ROCHESTER GAS & ELECTRIC COMPANY	(48) Robert E. Ginna 1	7/70	1520	490	3/ 2581	26	0/ 75
29. SOUTHERN CALIFORNIA EDISON COMPANY	(49) San Onofre 1	1/68	1347	456	27/ 2582	18	0/ 97
30. SACRAMENTO MUNICIPAL UTILITY DISTRICT	(50) Rancho Seco 1	4/75	2772	917	31/ 2797	22	0/ 17
31. TOLEDO EDISON COMPANY	(51) Davis-Besse 1	11/77	2772	934	36/ 3639	13	1/ 379
32. TENNESSEE VALLEY AUTHORITY	(52) Browns Ferry 1	8/74	3293	1098	21/ 4003	26	7/ 119
	(53) Browns Ferry 2	3/75	3293	1098	16/ 2394	24	3/ 71
	(54) Browns Ferry 3	3/77	3293	1098	18/ 2011	16	0/ 37
33. VIRGINIA ELECTRIC & POWER COMPANY	(55) North Anna 1	6/78	2775	928	3/ 65	7	0/ 3
	(56) Surry 1	12/72	2441	811	1/ 879	22	2/ 11
	(57) Surry 2	5/73	2441	811	0/ 800	22	0/ 10
34. VERMONT YANKEE NUCLEAR POWER CORPORATION	(58) Vermont Yankee 1	11/72	1593	535	31/ 2947	26	4/ 380
35. WISCONSIN MICHIGAN POWER COMPANY	(59) Point Beach 1	12/70	1518	519	19/ 2296	30	1/ 169
	(60) Point Beach 2	9/72	1518	519	18/ 1898	24	1/ 165
36. WISCONSIN PUBLIC SERVICE CORPORATION	(61) Kewaunee 1	6/74	1650	540	37/ 6763	25	33/ 857
		TOTALS			1432/164345	1301	128/8396

NOTES ON STATUS OF NPRD REPORTS IN THE DATA BASE

(1) The order of appearance of Utilities in the chart is determined by alphabetical sort of NPRDS Utility codes, not names.

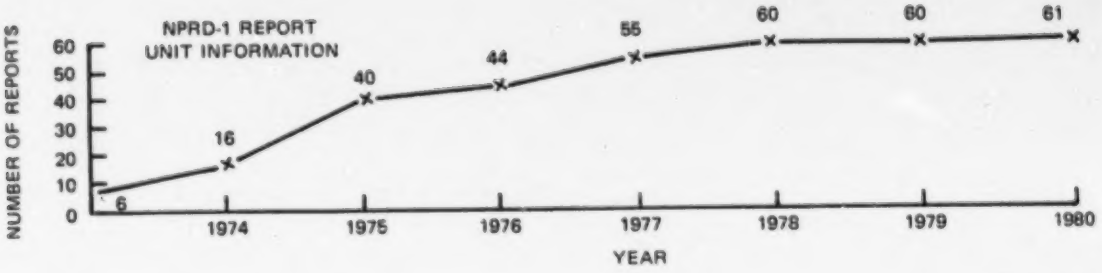
(2) The *commercial* date is the date declared by the Utility for commercial operation. This date is earlier than or the same as the NPRDS *data start date*, which is the date on which statistics on a Utility's reported systems and components begin accumulating.

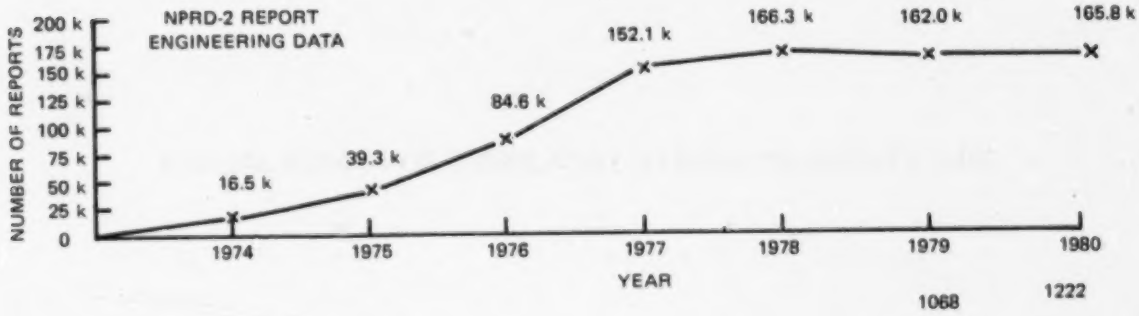
(3) The total number of Quarterly Operating Reports (Report Form NPRD-3) for each Plant-Unit is the number of reports submitted since its data start date. The data start date is not shown since it varies for systems and components. Approximately 72 Quarterly Operating Reports were not submitted in time to be included in this Annual Report.

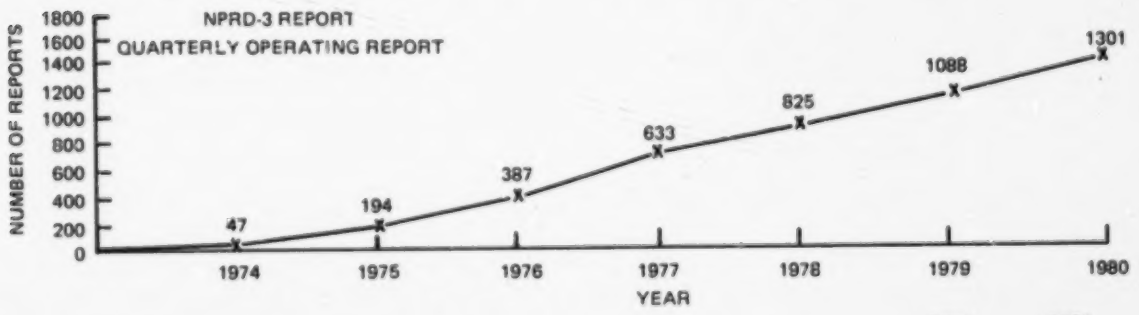
(4) The total number of Engineering Reports (Report Form NPRD-2) represents the total systems and components reported by each Plant-Unit and accepted into the NPRD data base.

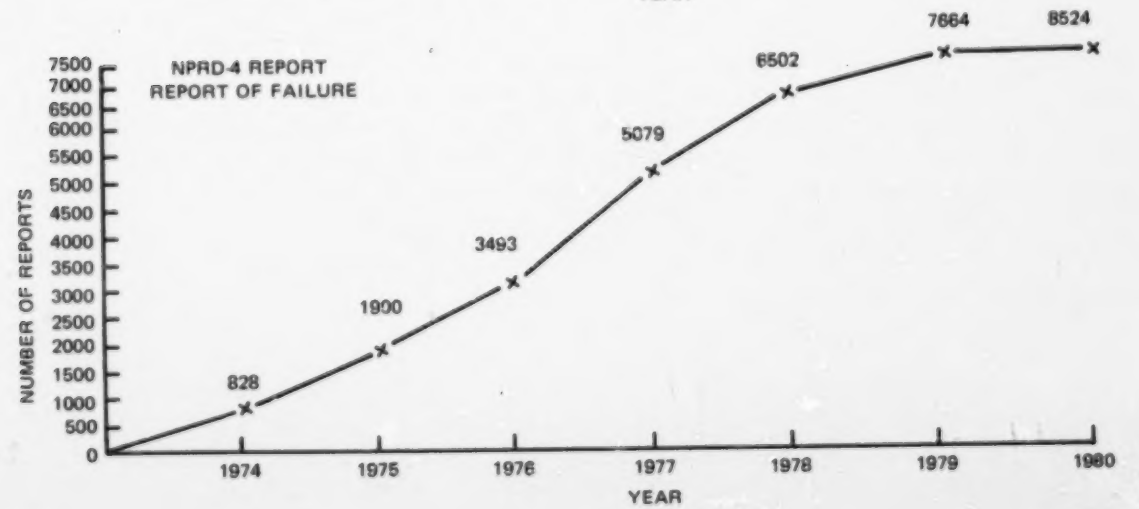
(5) The total number of Failure Reports (Report Form NPRD-4) represents the number of system and component failure reports submitted by each Plant-Unit, and accepted into the NPRDS data base.

CUMULATIVE NPRD REPORT SUBMITTALS BY YEAR









ANNUAL REPORT OF CUMULATIVE SYSTEM RELIABILITY (A02)

ANNUAL REPORT ON CUMULATIVE SYSTEM RELIABILITY
(NPRD Report A02)

The following Annual Reports of Cumulative System Reliability (NPRD Report A02) are a summary of operating statistics by (1) generic system name and (2) Nuclear Steam Supply System (NSSS) name for all safety-related systems in the NPRDS System. The reports covers the period between July 1, 1974 and December 31, 1980. Each NPRD Report A02 presents two types of summaries. The first is a summary of operating information for major types of systems which make up each generic category. The second is a summary of failure information on major component types within each generic system category.

SYSTEM SUMMARY

The major types of systems in each generic or NSSS type are identified by the system title which was designated by the respective NSSS supplier. The NSSS suppliers are General Electric (GE), Westinghouse (WEST), Babcock & Wilcox (B&W), and Combustion Engineering (CE). The summary shows, for each type of system, the number of systems for which engineering data have been reported by the Utilities in the NPRDS data base. The summary presents statistics on operating hours, calendar hours, number of tests, number of system failures, and failures per million calendar hours calculated for the systems in the data base. The number of system failures is defined as those failures which cause "loss of system function." The summary also shows the average restoration hours, average out-of-service hours, and number of failures for components contained within each type system. These component failures include those which cause LOSS OF SYSTEM FUNCTION and all other EFFECT OF FAILURE categories identified in the NPRDS.

MAJOR COMPONENT SUMMARY

The major components affecting the reliability of the generic system are identified in the summary by their generic component category and principal function (or application) of operation. The complete list of categories and functions is contained in the NPRD Report A03 section of this annual report. The summary shows the nine most frequently occurring component failures of the generic system, identified by generic function (or application). All failures reported on electrical conductors, pipes, fittings, shock suppressors and supports are combined under the category non-pedigree components. All other failures are listed under their own component category group. The summary presents statistics on number of failures and ratio of operating to calendar hours for each entry. OPERATING HOURS is a sum of the calculated percentages of time during which components are operating or functioning in their safety-related functions, whereas CALENDAR HOURS is the elapsed time in the reporting period from the data start date. All components having a smaller number of failures per million calendar hours are combined in the last category (ALL OTHERS).

The components are ranked in descending order of failures per million calendar hours. Failures per million calendar hours are calculated by taking the ratio of the sum of the failures to sum of the calendar hours reported by Utilities for the population of components in the NPRD data base for the generic system. This ratio is then multiplied by one million.

These statistics are displayed graphically in the summary. Correspondingly, the out-of-service and restoration hours for these component failures are shown as a range of hours between the highest and lowest values reported by the Utilities. The range of calculated values is indicated by the bar. The average values are marked with an asterisk (*) for out-of-service hours, and with a blank square (□) for restoration hours within the range with the values printed out over them. The effect of failures caused by the component on the system and plant is shown as histograms of percentages in the summary.

NOTES ON SYSTEM RELIABILITY DATA PRESENTATION

(1) The count under the systems column in the table is arrived at by summing, for each system type, over the data base for which engineering data reports (Report Form NPRD-2) have been received. The reporting Utilities have the responsibility of determining their reportable scope.

(2) The totals for component failures for each type of system represent the number of failures reported on components with the system code identified in the component engineering data report (Report Form NPRD-2).

(3) The Effect of Failure histograms may total (1) less than 100 percent because some failure reports were submitted prior to the time that this entry became mandatory, and thus these data were not reported, or (2) more than 100 percent because reporting procedures also allow for a selection of more than one entry on the failure report form (Report Form NPRD-4) for Effect of Failures for each failure report submitted.

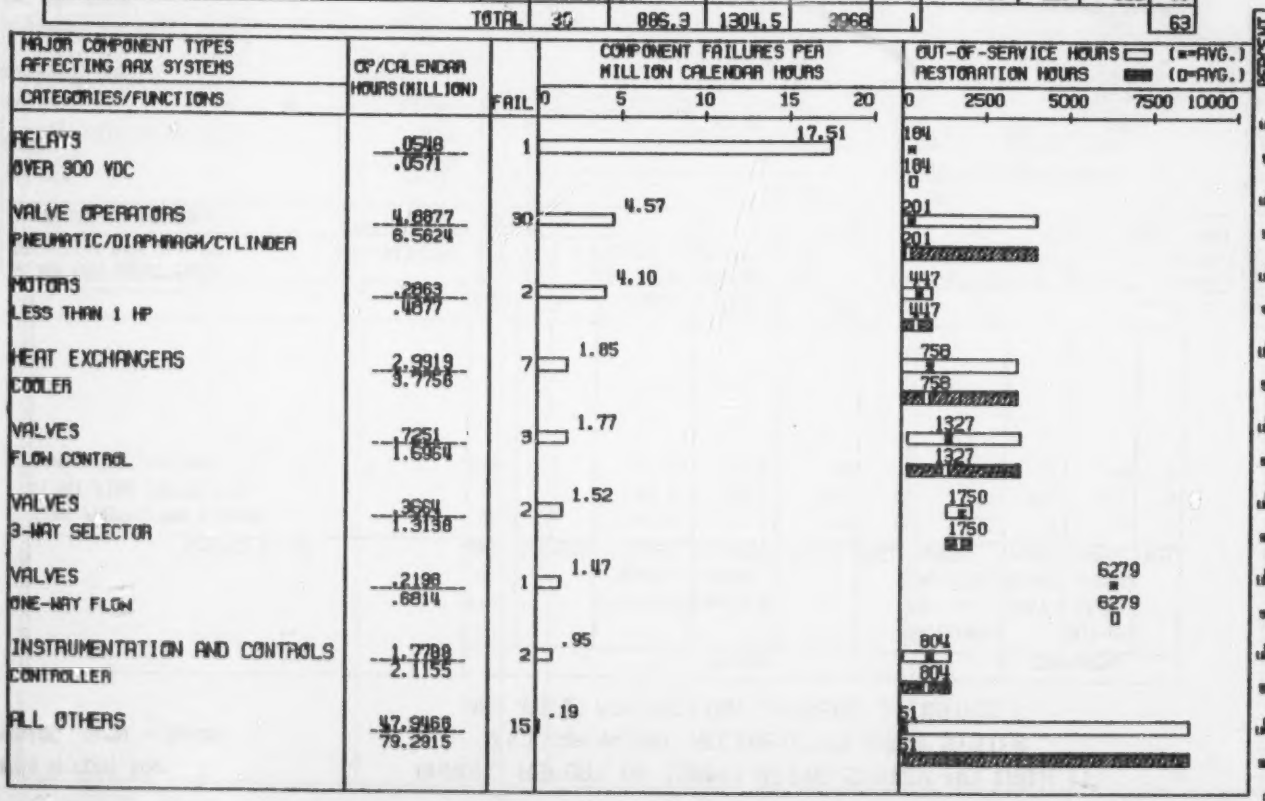
(4) Where only an asterisk (*) or a blank square (□) appears in the chart, the minimum and maximum values for out-of-service and/or restoration hours are of the same magnitude, and the ranges are approximately zero.

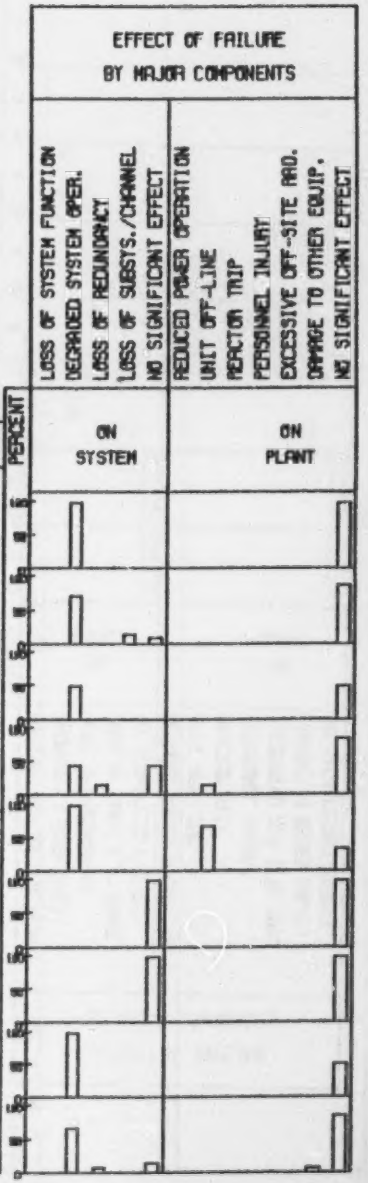
ANNUAL REPORT OF CUMULATIVE SYSTEM RELIABILITY (A02) FOR GENERIC SYSTEMS

NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAX AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REAC.BLDG. HEAT/VENT/AC	GE	5	89.4	212.7	9781	0	.00	122	122	3
CONT. PEN. ROOM VENT. SYS.	CE	2	4.2	90.1	51	0	.00	1230	1230	5
PLANT VENTILATION SYSTEM	CE	4	199.7	232.5	71	0	.00	917	917	11
AIR CONDITIONING SYSTEM	WEST	5	163.1	186.1	42	1	5.37	2698	2698	5
AUXILLIARY BLDG. VENT.SYS.	WEST	5	91.8	212.3	12	0	.00	53	53	20
ELECTRICAL EQUIP. VENT.	WEST	3	121.4	121.4	5	0	.00	0	0	0
SCREEN HOUSE VENT. SYS.	WEST	1	40.5	40.5	0	0	.00	0	0	0
TURBINE BLDG. VENT. SYS.	WEST	5	176.2	208.9	6	0	.00	429	429	19
	TOTAL	30	885.3	1304.5	3968	1				63





NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ABX FIRE PROTECTION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FIRE PROTECTION SYSTEM	GE	1	57.0	57.1	78	0	.00	0	0	0
PLANT FIRE PROTECTION	CE	2	65.9	109.7	682	0	.00	501	501	4
FIRE PROT. SYSTEM	WEST	2	111.9	111.9	98	1	8.94	78	78	1
	TOTAL	5	234.8	278.7	858	1				5

MAJOR COMPONENT TYPES AFFECTING ABX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 200 400 600 800)
VALVES OTHER	.0000 / .0308	1	32.52	78 ■ 78 □
VALVES PRESSURE CONTROL	.0000 / .0496	1	20.15	507 ■ 507 □
VALVES ONE-WAY FLOW	.3172 / .3503	3	8.33	498 ■ 499

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

NPRD REPORT A02
PERIOD. 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ACX COMMUNICATION SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
COMMUNICATION SYSTEM	WEST	1	54.9	57.1	0	0	.00	108	108	3
TOTAL		1	54.9	57.1	0	0				3

MAJOR COMPONENT TYPES AFFECTING ACX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 100 200 300 400)
ANNUNCIATOR MODULES	.0548	9	17.51	108
AUDIO	.1714			108

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 10 20 30 40 50 60 70 80 90 100

NPRD REPORT A02

PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
BAX AREA MONITORING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AREA RAD. MOINT. SYS.	GE	2	109.6	109.7	150	0	.00	4	4	2
RADIATION MONITORING SYSTEM	B&W	2	63.8	80.3	37	0	.00	281	281	133
	TOTAL	4	173.4	190.0	187	0				135

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING BAX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 1000 2000 3000 4000)
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.3681 / 2.3905	133	55.64	281 / 281
INSTRUMENTATION AND CONTROLS INDICATOR	.1684 / .1689	2	11.84	4 / 4

PERCENT

ON SYSTEM | ON PLANT

NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
BBX AIRBORNE RADIOACTIVITY MONITORING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PRIM.CONT.ATSMP. SYS.	GE	7	325.6	348.5	276	0	.00	376	376	28
TOTAL		7	325.6	348.5	276	0				28

MAJOR COMPONENT TYPES AFFECTING BBX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1000 2000 3000 4000)
INSTRUMENTATION AND CONTROLS RECORDER	.3579 / .3599	13	36.12	216 / 216
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.0570 / .0571	1	17.51	25 / 25
INSTRUMENTATION AND CONTROLS TRANSMITTER	.2784 / .3021	5	16.55	14 / 14
PENETRATIONS, PRIMARY CONT. PROCESS PIPING	.3632 / .5258	3	5.71	976 / 976
VALVES SHUTOFF,ISOLATION,STOP	.8132 / .9774	4	4.09	337 / 337
INSTRUMENTATION AND CONTROLS INDICATOR	1.4694 / 1.4790	2	1.36	1672 / 1672

EFFECT OF FAILURE BY MAJOR COMPONENTS

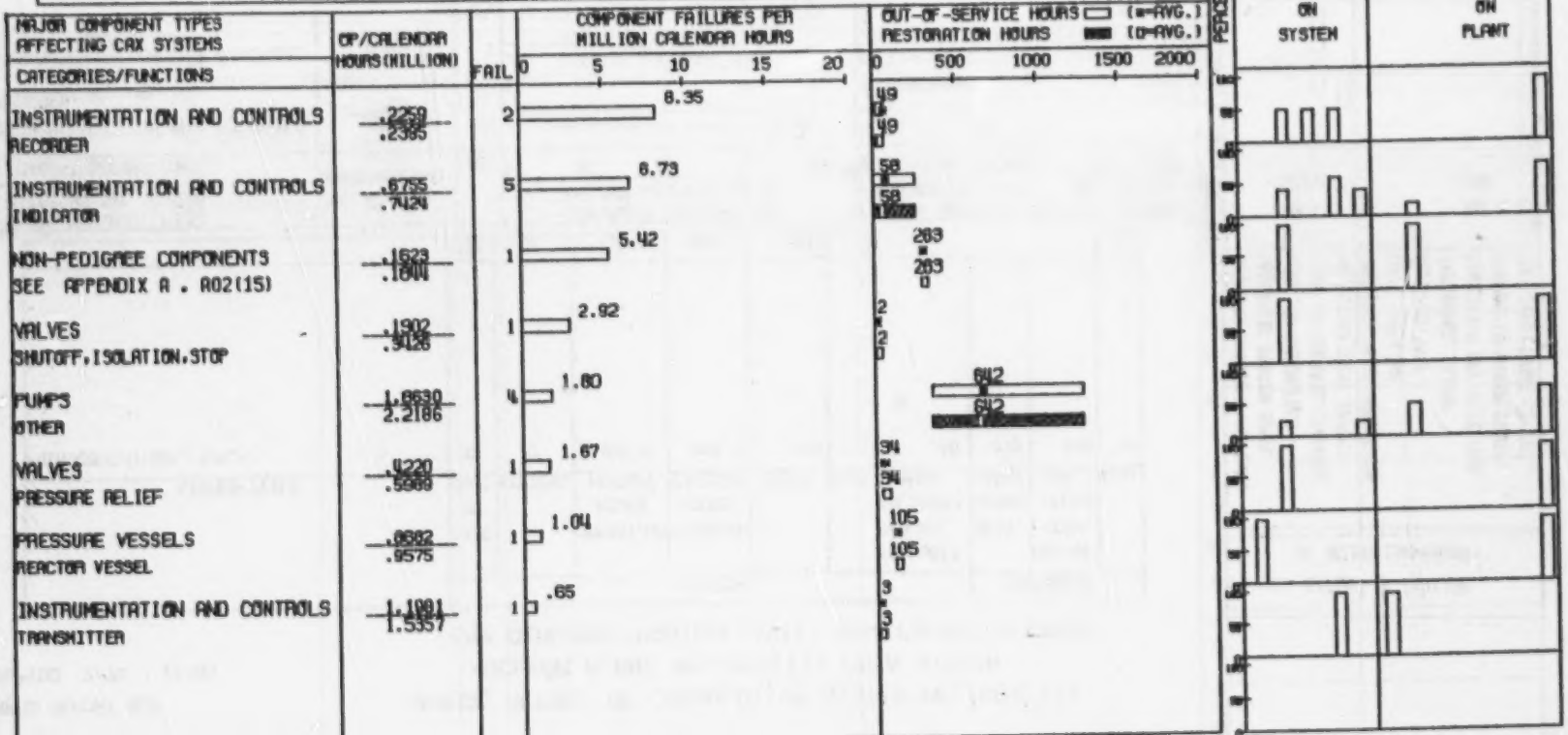
	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60)

NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CAX REACTOR VESSELS & APPURTENANCES

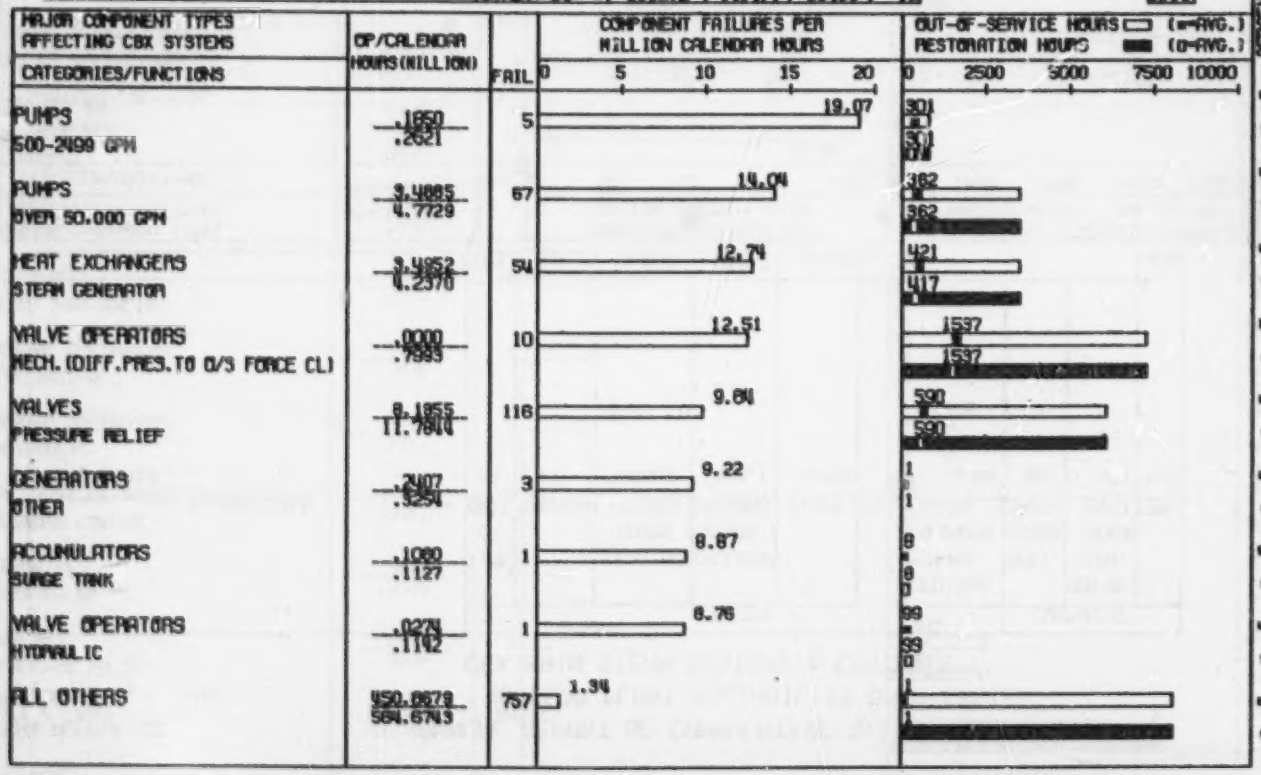
SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR ASSEMBLY (VESSEL)	GE	10	444.0	489.0	11874	0	.00	218	218	15
REACTOR VESSEL	B&W	6	287.6	304.3	7233	1	3.29	105	105	1
REACTOR VESSEL	CE	3	80.1	99.3	289	0	.00	0	0	0
TOTAL		19	811.7	892.6	19396	1				16

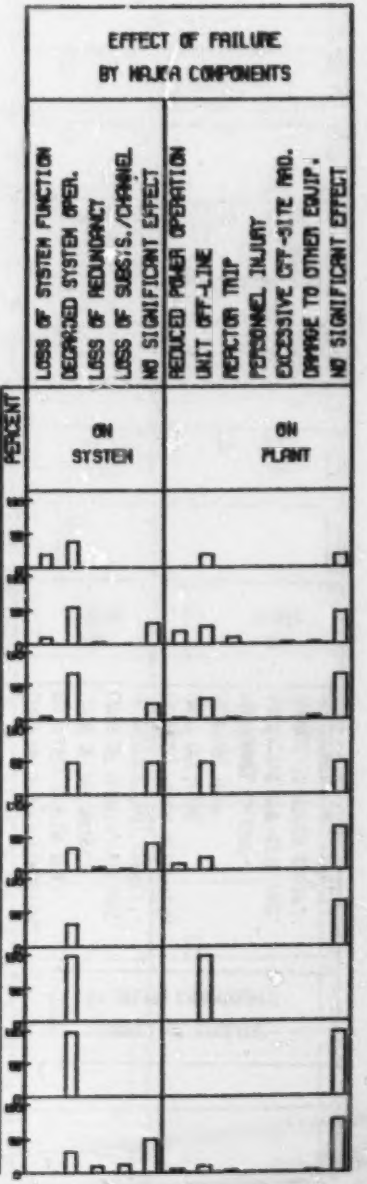


NPRD REPORT R02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBX COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NUCLEAR BOILER SYSTEM	GE	15	622.8	748.2	14784	0	.00	425	425	274
REACTOR RECIRCULATION STS.	GE	18	726.1	917.9	22236	2	2.18	508	508	118
RECIRCULATION FLOW SYS.	GE	11	474.2	584.5	24780	1	1.71	69	69	7
REACTOR COOLANT	B&W	10	361.9	493.1	13745	4	8.11	678	678	149
PRESSURIZER	B&W	3	99.3	130.6	6	0	.00	0	0	0
PRESSURIZER RELIEF SYSTEM	B&W	4	94.3	185.7	24	0	.00	883	901	34
REACTOR COOLANT SYSTEM	CE	7	291.9	315.9	35785	1	9.17	574	574	92
REACTOR COOLANT SYSTEM	WEST	21	892.5	1028.8	28098	11	10.69	463	463	340
	TOTAL	89	3562.2	4404.1	39458	19				1014





NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CCX MAIN STEAM SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
STEAM SYSTEM	GE	17	670.2	860.7	28905	3	3.49	441	441	169
TOTAL		17	670.2	860.7	28905	3				169

MAJOR COMPONENT TYPES AFFECTING CCX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (x=AVG.) RESTORATION HOURS (O=AVG.) (0 1500 3000 4500 6000)
RELAYS 100-199 VAC	.0007 / .0337	1	29.69	89 / 89
VALVE OPERATORS ELECTRIC MOTOR-OC	.0354 / .2720	3	11.03	280 / 280
VALVES SHUTOFF,ISOLATION,STOP	4.0536 / 5.4582	56	10.26	668 / 668
CIRCUIT CLOSERS/INTERRUPTERS SWITCH(OTHER THAN SENSOR)	.1445 / .2881	2	6.94	27 / 27
VALVES PRESSURE RELIEF	3.4806 / 6.4818	21	3.24	267 / 267
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	2.1851 / 4.7793	15	3.14	145 / 145
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	3.1387 / 4.0008	11	2.75	118 / 118
VALVE OPERATORS ELECTRIC MOTOR-AC	.4720 / 1.3345	3	2.25	1749 / 1749
ALL OTHERS	37.6442 / 54.0343	57	1.05	7 / 7

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60)

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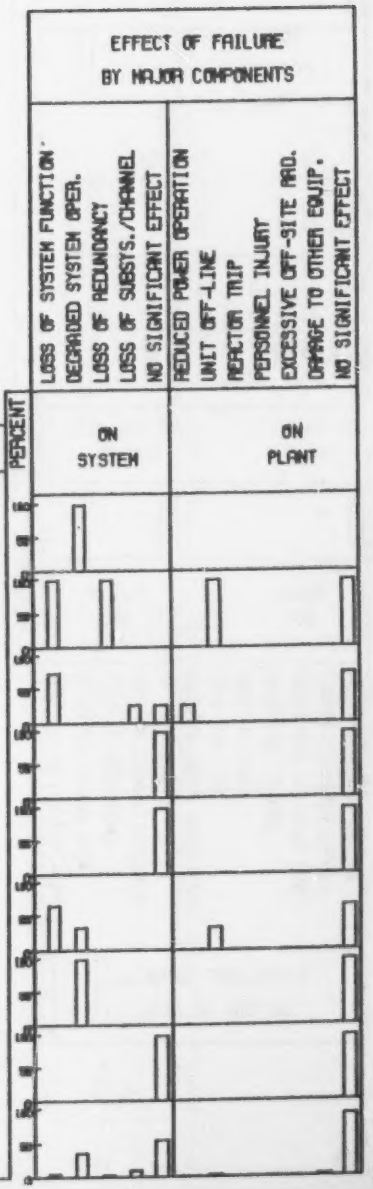
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CEX REACTOR CORE ISOLATION COOLING SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
REACTOR CORE ISOL. SYS.	GE	13	1.4	661.2	18380	11	16.64	416	416	111
TOTAL		13	1.4	661.2	18380	11				111

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING CEX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG.) (▬=AVG.)
GENERATORS	.0424 / .0570	2	35.09	0 / 0
INVERTER				
PUMPS	.0007 / .0659	1	15.17	341 / 341
OVER 50,000 GPM				
TURBINES	.0008 / .2706	4	14.57	16 / 16
LESS THAN 500 HP				
VALVE OPERATORS	.1074 / .1076	1	9.29	9 / 9
SOLENOID-DC				
VALVE OPERATORS	.0000 / .1102	1	8.76	1381 / 1381
HYDRAULIC				
MECHANICAL FUNCTION UNITS	.0000 / .3461	3	8.67	34 / 34
TURBINE CONTROL				
TURBINES	.0011 / .3589	2	5.57	3 / 3
500-999 HP				
VALVES	.6836 / .8560	3	3.50	817 / 817
PRESSURE RELIEF				
ALL OTHERS	39.3239 / 83.7891	94	1.12	5 / 5



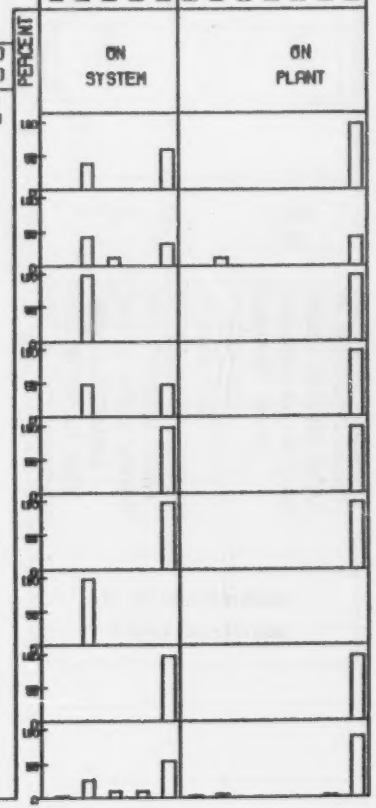
NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CFX RESIDUAL HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
RESIDUAL HEAT REMOVAL SYS.	GE	17	241.5	876.6	18045	1	1.14	345	345	196
ISOLATION COND/AUX. SYS.	GE	6	14.7	303.3	11333	1	3.30	289	289	39
DECAY HEAT REMOVAL SYSTEM	B&W	5	56.2	219.2	49	0	.00	467	467	46
SHUTDOWN COOLING SYSTEM	CE	7	53.3	291.2	11580	1	3.43	3257	3257	3
RESIDUAL HEAT REMOVAL SYS.	WEST	20	161.0	969.7	39546	0	.00	190	190	42
	TOTAL	55	526.7	2660.0	80553	3				326

MAJOR COMPONENT TYPES AFFECTING CFX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 2000 4000 6000 8000)
VALVE OPERATORS / OTHER	.0000 / .1060	5	47.16	233 / 233
PUMPS / UNDER 500 GPM	.1127 / 1.1159	9	8.07	131 / 131
ACCUMULATORS / HOLD UP STORAGE TANK	.0570 / .1303	1	7.67	1160 / 1160
CIRCUIT CLOSERS/INTERRUPTERS / CONTACTOR	.2272 / .3847	2	5.20	10 / 10
MOTORS / OTHER	.0533 / .2374	1	4.21	2602 / 2602
VALVES / OTHER	.2804 / .3052	1	3.28	15 / 15
HEAT EXCHANGERS / CONDENSER	.1370 / .6260	2	3.19	0 / 0
CIRCUIT CLOSERS/INTERRUPTERS / SWITCHGEAR	.0195 / .3314	1	3.02	48 / 48
ALL OTHERS	208.5905 / 383.3183	304	.79	1 / 1

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CGX REACTOR COOLANT CLEANUP SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR WATER CLEANUP SYS.	GE	10	851.8	893.6	23984	3	3.36	861	861	40
TOTAL		10	851.8	893.6	23984	3				40

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING CGX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (▩=AVG.) (0 2000 4000 6000 8000)
VALVE OPERATORS MECH. (DIFF. PRES. TO O/S FORCE CL)	.0357 / .0383	1	25.47	4 / 4
INSTRUMENTATION AND CONTROLS TRANSMITTER	.2051 / .2240	4	17.85	56 / 56
VALVE OPERATORS ELECTRIC MOTOR-DC	.4304 / .7514	8	10.65	460 / 460
INSTRUMENTATION AND CONTROLS INDICATOR	.1836 / .1875	1	5.33	1128 / 1128
VALVE OPERATORS ELECTRIC MOTOR-AC	.6481 / 1.3266	5	3.77	92 / 92
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.2735 / .2988	1	3.35	26 / 26
CIRCUIT CLOSERS/INTERRUPTERS STARTER	.0745 / .4811	1	2.08	6 / 6
VALVES SHUTOFF. ISOLATION. STOP	4.1139 / 5.9301	11	1.84	1933 / 1933
ALL OTHERS	10.2598 / 12.5240	8	.64	19 / 19

EFFECT OF FAILURE BY MAJOR COMPONENTS (PERCENT)

ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CHX FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONDENSATE AND FEEDWATER	GE	19	776.4	950.5	21771	1	1.05	383	383	60
TOTAL		19	776.4	950.5	21771	1				60

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING CHX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 1000 2000 3000 4000)	PERCENT ON SYSTEM	PERCENT ON PLANT
MECHANICAL FUNCTION UNITS	.0246 / .0384	1	28.03	41 / 41 / 0		
TURBINE CONTROL						
VALVES	1.7870 / 2.3115	22	9.52	452 / 451		
ONE-WAY FLOW						
HEAT EXCHANGERS	.4560 / .5492	4	7.28	49 / 49 / 0		
OTHER						
PUMPS	.3131 / .5492	3	5.46	137 / 137 / 0		
2500-9999 GPM						
INSTRUMENTATION AND CONTROLS	.3039 / .3705	2	5.40	17 / 17		
RECORDER						
VALVE OPERATORS	.2814 / .4943	1	2.02	2781 / 2781 / 0		
ELECTRIC MOTOR-AC						
VALVES	4.3092 / 5.1562	10	1.94	431 / 431		
SHUTOFF, ISOLATION, STOP						
VALVE OPERATORS	.3880 / .5126	1	1.84	26 / 26 / 0		
PNEUMATIC/DIAPHRAGM/CYLINDER						
ALL OTHERS	18.5555 / 21.2753	16	.68	20 / 20		

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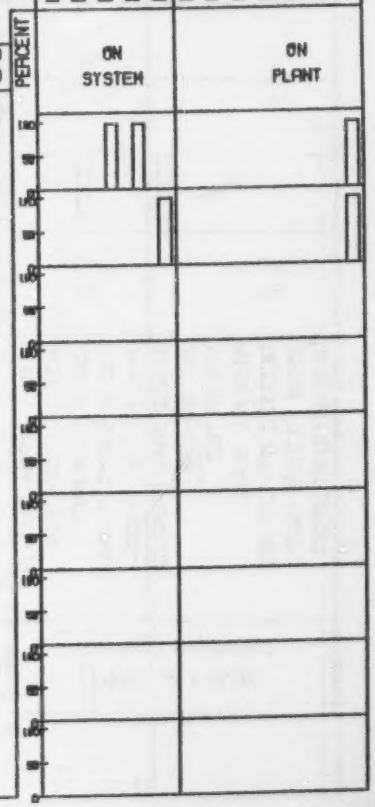
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CIX REACTOR COOLANT PRESS. BOUND. LEAK. DET. SYS.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
LEAK DETECTION SYSTEM	GE	4	158.5	185.1	102	0	.00	2	3028	5
	TOTAL	4	158.5	185.1	102	0				5

MAJOR COMPONENT TYPES AFFECTING CIX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (■=AVG.) / RESTORATION HOURS (□=AVG.) (0 1500 3000 4500 6000)
INSTRUMENTATION AND CONTROLS TRANSMITTER	.0824 / .0835	1	11.98	4 / 4
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.7952 / .8788	4	4.55	3781 / 2

EFFECT OF FAILURE BY MAJOR COMPONENTS



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PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EAX OFFSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
POWER TRANSMISSION SYS.	GE	5	195.2	204.0	0	0	.00	3	3	1
TOTAL		5	195.2	204.0	0	0				1

MAJOR COMPONENT TYPES AFFECTING EAX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 5 10 15 20)
NON-PEDIGREE COMPONENTS	.0001 / .0571	1	17.51	3 / 3
SEE APPENDIX A . A02(15)				

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (100 90 80 70 60 50 40 30 20 10 0)

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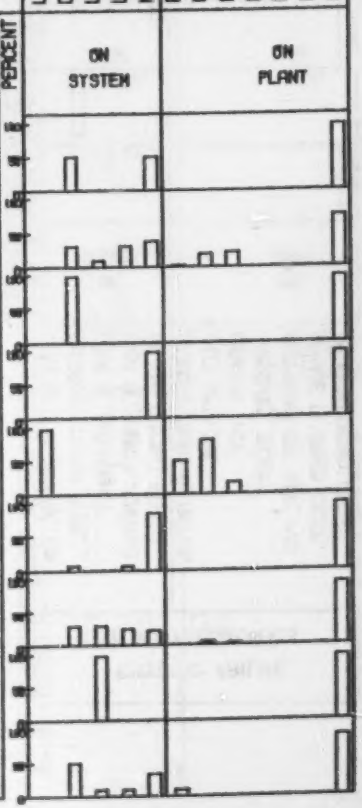
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBX AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
PLANT ELECTRICAL SYSTEMS	GE	10	884.8	892.9	24987	0	.00	114	114	32
STANDBY POWER SYSTEM	GE	5	239.7	239.8	150	0	.00	0	0	0
STATION POWER DIST. SYSTEM	CE	19	736.9	769.1	12713	0	.00	180	202	30
AUXILLIARY POWER SYS.	WEST	4	190.2	190.2	249	0	.00	159	159	11
AC POWER DISTRIBUTION SYSTEM	B&W	9	433.8	459.4	7408	0	.00	148	156	24
AC POWER SYS. AND CONTROLS.	WEST	16	747.2	776.8	29045	5	6.44	49	49	34
AC INST. POWER	B&W	5	250.2	251.6	7388	0	.00	23	23	6
A.C. INSTRUMENT POWER SYSTEM	CE	3	85.8	86.2	4703	0	.00	0	0	0
	TOTAL	79	3568.4	3666.0	86641	5				137

MAJOR COMPONENT TYPES AFFECTING EBX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 150 300 450 600)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 500 1000 1500 2000)
RELAYS 100-199 VDC	67.7783 .0046	2	431.82	41 41
GENERATORS INVERTER	3.1688 3.2862	34	10.34	148 148
BATTERIES & CHARGERS STATION BATTERY	.0000 .1102	1	8.75	0 0
BATTERIES & CHARGERS OTHER	.2278 .2284	1	4.38	214 214
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	2.2688 2.3022	6	2.61	70 70
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	4.0615 8.8387	15	1.70	6 6
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	4.5592 51.5740	65	1.26	150 137
GENERATORS GENERATOR	1.0340 1.0675	1	.94	94 94
ALL OTHERS	172.6480 267.4162	12	.04	9 9

EFFECT OF FAILURE BY MAJOR COMPONENTS



NPRD REPORT RQ2
PERIOD 7/74 - 12/80

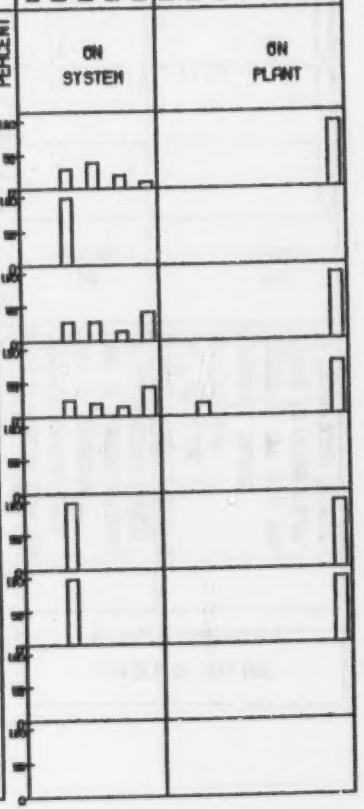
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ECX DC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
DC INSTRUMENT POWER	GE	8	381.4	381.4	4718	0	.00	172	172	1
BATTERY SYSTEM	GE	14	671.0	683.4	16268	1	1.46	34	34	4
D.C.POWER SYS.AND CONTROLS	WEST	15	609.6	701.5	30719	0	.00	667	667	28
DC POWER SYSTEMS AND CONTROLS	B&W	5	244.2	260.5	7272	0	.00	799	799	6
D.C. INSTRUMENT POWER SYSTEM	CE	3	65.4	86.2	4697	0	.00	29	29	5
TOTAL		45	1991.6	2113.0	63674	1				44

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING ECX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (0=AVG.) (0 1500 3000 4500 6000)
GENERATORS	1.0165 / 1.0878	10	9.11	645 / 645
INVERTER				
INSTRUMENTATION AND CONTROLS	.2740 / .2656	2	7.00	8 / 8
CONTROLLER				
BATTERIES & CHARGERS	2.3239 / 2.4150	7	2.80	1163 / 1163
OTHER				
BATTERIES & CHARGERS	41.2443 / 42.6768	21	.49	371 / 371
STATION BATTERY				
CIRCUIT CLOSERS/INTERRUPTERS	4.2715 / 4.2622	1	.23	25 / 25
CONTACTOR				
CIRCUIT CLOSERS/INTERRUPTERS	18.1266 / 20.1029	2	.10	742 / 742
SWITCH(OTHER THAN SENSOR)				
CIRCUIT CLOSERS/INTERRUPTERS	20.9227 / 65.6385	1	.01	19 / 19
CIRCUIT BREAKER				



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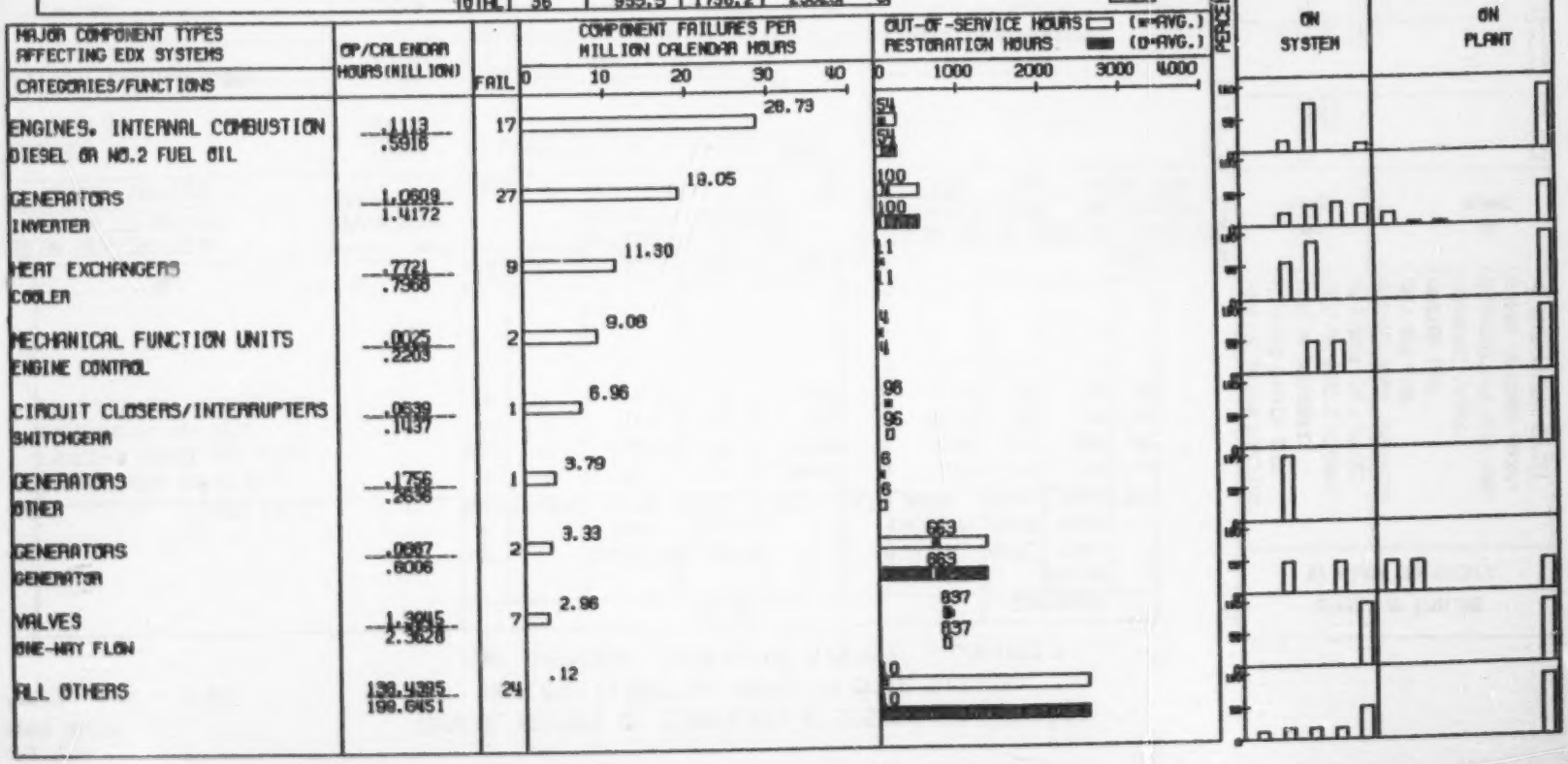
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EDX ONSITE POWER SYS. & CONT. (COMPOSITE AC&DC)

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EMERGENCY POWER SYSTEMS	B&W	8	49.4	412.4	298	0	.00	360	360	4
EMERGENCY POWER SOURCES	CE	16	355.8	694.4	8499	0	.00	200	200	41
ELECTRICAL SYSTEMS	WEST	12	550.3	629.4	14232	0	.00	153	153	45
TOTAL		36	955.5	1736.2	23029	0				90



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EEX EMERGENCY GENERATOR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
DIESEL EMERG. POWER SYS.	GE	18	69.3	917.3	31840	3	3.27	160	160	124
EMERGENCY DIESEL AUX. SYS.	WEST	15	122.8	728.1	39173	2	2.75	531	531	96
EMERG. DIESEL GEN. SYS.	B&W	3	.9	136.4	187	2	14.66	93	93	21
DIESEL STANDBY POWER SYSTEM	CE	1	1.8	44.1	260	0	.00	58	58	5
TOTAL		37	194.8	1825.9	71460	7				246

MAJOR COMPONENT TYPES AFFECTING EEX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ a=AVG.) / RESTORATION HOURS (▬ d=AVG.) (0 2000 4000 6000 8000)
TURBINES OVER 5000 HP	.0014 / .0548	2	36.43	86 / 56
ENGINES, INTERNAL COMBUSTION DIESEL OR NO.2 FUEL OIL	.0149 / 3.5805	94	26.25	302 / 302
GENERATORS OTHER	.0033 / .0923	2	21.68	89 / 89
GENERATORS GENERATOR	.0129 / 5.1989	49	15.32	217 / 217
BLOWERS COMPRESSOR	.4310 / 2.6767	30	11.21	95 / 95
PUMPS 500-2499 GPM	.1339 / .2856	2	7.00	21 / 21
RELAYS OTHER	.0001 / .1494	1	6.69	26 / 26
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	.5546 / .5560	2	3.60	508 / 508
ALL OTHERS	68.8085 / 169.9402	64	.38	7 / 7

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EFX EMERGENCY LIGHTING SYSTEMS & CONTROLS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
LIGHTING SYSTEM (EMERG.)	WEST	2	54.8	109.6	0	0	.00	0	0	0
	TOTAL	2	54.8	109.6	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FBX SPENT FUEL STORAGE FACILITIES

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL STORAGE EQUIPMENT	GE	6	10.9	302.5	12	0	.00	0	0	0
	TOTAL	6	10.9	302.5	12	0				0

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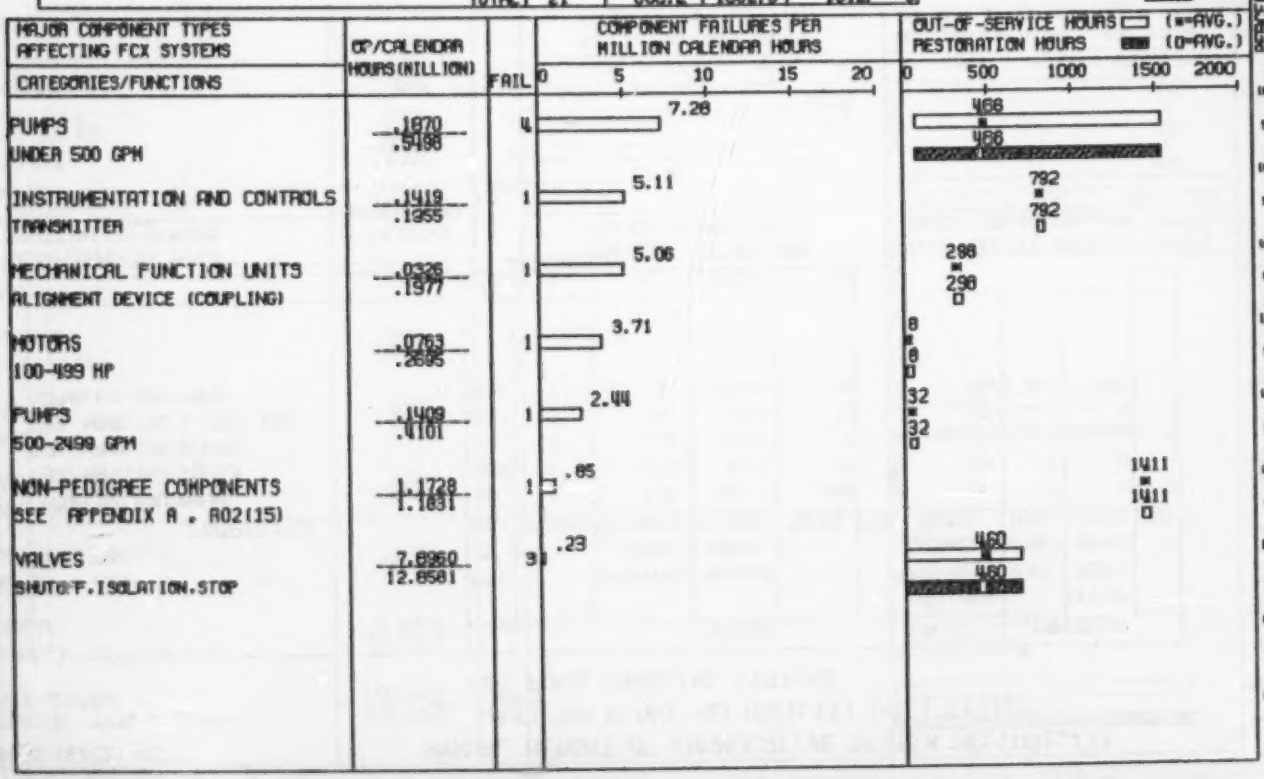
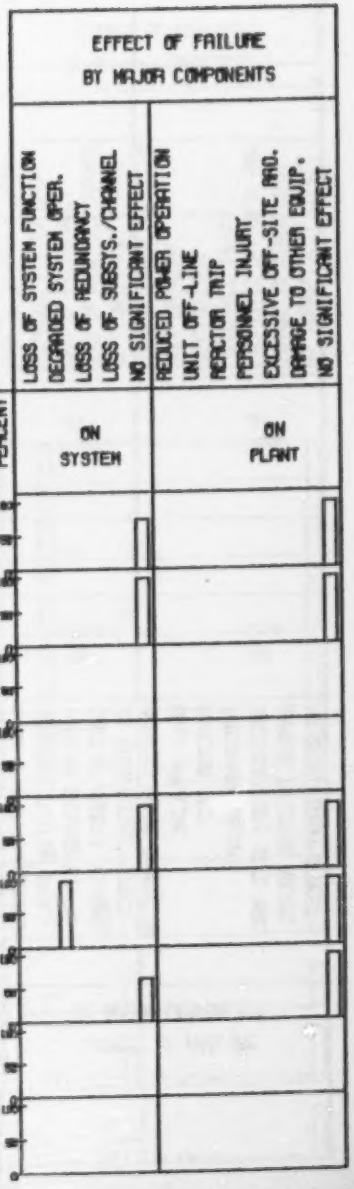
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FCX SPENT FUEL POOL COOLING & CLEANUP SYS. &CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL POOL COOLING SYS.	GE	6	296.6	300.5	0	0	.00	20	20	2
SPENT FUEL COOLING SYSTEM	B&W	2	75.9	77.6	167	0	.00	1411	1411	1
SPENT FUEL POOL COOL. SYS.	CE	4	170.1	216.2	407	0	.00	506	506	7
SPENT FUEL PIT COOL. SYS.	WEST	5	171.6	212.4	24	0	.00	0	0	0
REFUELING WATER SYSTEM	WEST	4	92.0	195.3	414	0	.00	397	397	2
TOTAL		21	806.2	1002.0	1012	0				12





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FDX FUEL HANDLING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REFUELING EQUIPMENT	GE	6	7.5	370.5	244	0	.00	0	0	0
FUEL HANDLING SYSTEM	B&W	1	13.0	33.7	0	0	.00	0	0	0
FUEL HANDLING SYSTEM	CE	1	1.6	44.0	5	0	.00	0	0	0
FUEL HANDLING & STOR. EQP.	WEST	1	.0	30.8	0	0	.00	0	0	0
REFUELING EQUIPMENT	WEST	2	.5	103.0	10	0	.00	820	820	2
TOTAL		11	22.6	582.0	259	0				2

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING FDX SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 250 500 750 1000)
RELAYS 100-199 VAC	.0003 / .0571	1	17.51	820 ▪ 820 0
MOTORS 1-4.99 HP	.0007 / .6282	1	1.59	820 ▪ 820 0

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

ON SYSTEM

ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HBX MAIN STEAM SUPPLY SYSTEM & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STEAM SUPPLY SYSTEM	B&W	7	254.4	335.6	24	1	2.98	457	437	85
STEAM AND FEEDWATER SYSTEM	CE	13	620.7	709.7	18120	0	.00	595	595	142
STEAM SYSTEM	WEST	19	709.5	932.6	32034	4	4.28	515	515	220
TOTAL		39	1584.6	1977.9	50178	5				427

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING HBX SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.) (0 2000 4000 6000 8000)	PERCENT ON SYSTEM	PERCENT ON PLANT
TURBINES 500-999 HP	.0294 / .0662	5	58.02	89 / 88		
VALVES PRESSURE CONTROL	.9683 / 1.8916	33	18.02	590 / 590		
RELAYS 100-199 VAC	.0548 / .0571	1	17.51	25 / 25		
RELAYS 200-300 VAC	.0481 / .0571	1	17.51	2 / 2		
VALVES DRAIN	.4090 / .5616	5	8.90	2179 / 2179		
VALVE OPERATORS HYDRAULIC	.4233 / .5609	4	7.13	44 / 44		
VALVE OPERATORS ELECTRIC MOTOR-OC	.0294 / .4485	3	6.69	595 / 595		
VALVES SHUTOFF,ISOLATION,STOP	15.6634 / 24.7146	89	3.60	529 / 528		
ALL OTHERS	110.4848 / 153.3192	206	1.87	2 / 2		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HEX TURBINE BYPASS SYSTEMS & CONTROLS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
TURBINE BYPASS SYSTEM	B&W	2	.7	84.2	21	0	.00	0	0	0
TOTAL		2	.7	84.2	21	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HFX CIRCULATING WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CIRCULATING WATER SYSTEM	WEST	1	48.1	57.1	0	0	.00	659	659	2
TOTAL		1	48.1	57.1	0	0				2

MAJOR COMPONENT TYPES AFFECTING HFX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL
INSTRUMENTATION AND CONTROLS	.7123 / .7425	2
INDICATOR		

COMPONENT FAILURES PER MILLION CALENDAR HOURS
0 5 10 15 20
2.69

OUT-OF-SERVICE HOURS ▭ (x=AVG.)
RESTORATION HOURS ▬ (D=AVG.)
0 500 1000 1500 2000
659
x
659

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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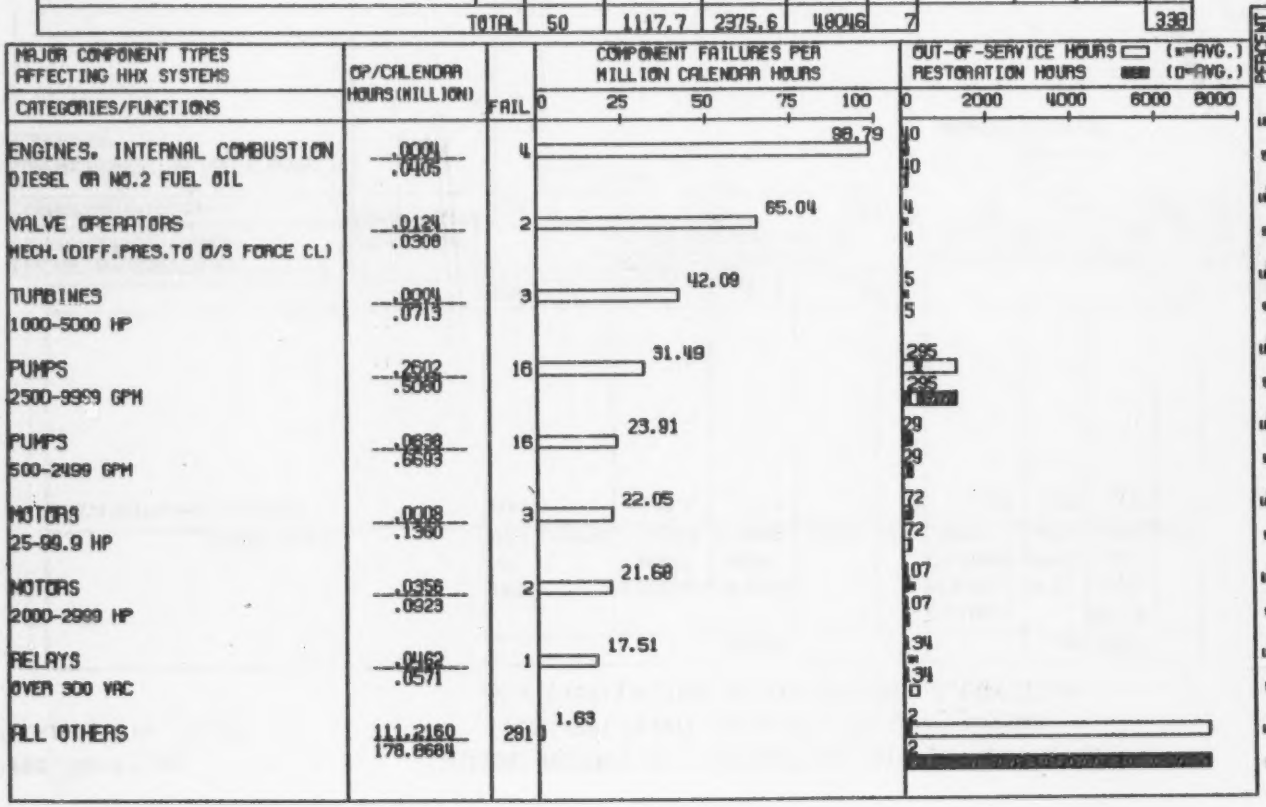
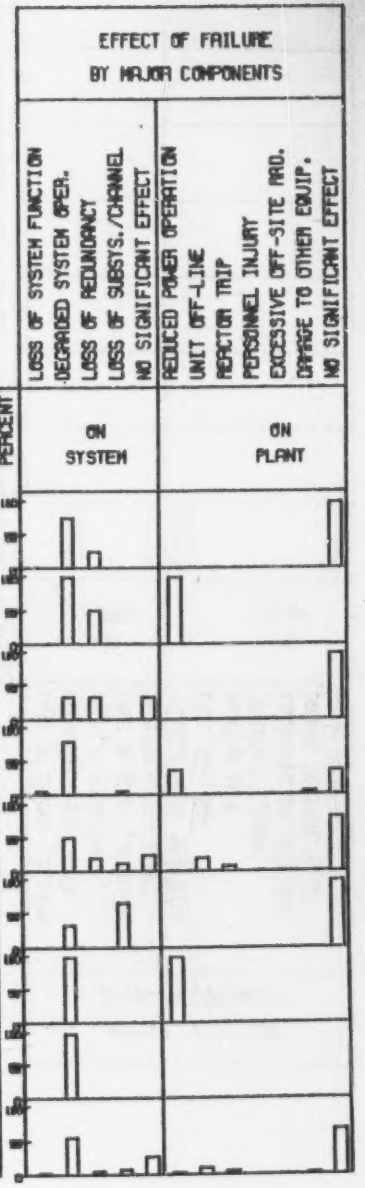
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HHX CONDENSATE AND FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FEEDWATER SYSTEM	B&W	8	308.2	388.4	4531	0	.00	664	664	51
EMERGENCY FEEDWATER SYSTEM	B&W	6	.7	272.1	92	1	3.68	207	207	25
FEEDWATER SYSTEM (AUX).	WEST	19	226.8	932.1	21969	2	2.15	413	413	105
CONDENSATE SYSTEMS	WEST	2	55.0	88.6	0	0	.00	224	224	14
STEAM GEN.FEEDWATER SYS.	WEST	15	527.0	694.4	21454	4	5.76	425	425	143
TOTAL		50	1117.7	2375.6	48046	7				338





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HIX STEAM GENERATOR BLOWDOWN SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STEAM GENER.BLOWDOWN SYS.	WEST	13	476.0	614.1	14409	0	.00	490	490	14
TOTAL		13	476.0	614.1	14409	0				14

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING HIX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.) (0 1000 2000 3000 4000)
VALVES PRESSURE RELIEF	.0196 .0308	1	32.52	80 80
VALVE OPERATORS ELECTRIC MOTOR-AC	.2710 .9792	4	4.08	384 384
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	1.2196 1.2301	4	3.23	500 500
VALVES FLOW CONTROL	.0043 .0630	1	2.16	2598 2598
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.0549 .5168	1	1.93	336 336
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.0957 .5751	1	1.74	142 142
VALVES SHUTOFF.ISOLATION.STOP	.8105 5.3336	2	.37	69 69

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT: 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IAX REACTOR TRIP SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NEUTRON MONITORING SYSTEM	GE	17	770.9	834.3	27415	1	1.20	804	804	308
NUCLEAR INSTRUMENTATION	B&W	7	352.0	360.1	12253	0	.00	49	49	8
NUCLEAR INSTRUMENTATION	CE	3	123.4	136.6	17092	1	7.32	189	189	20
NUCLEAR PROTECTION INSTR.	WEST	23	957.7	1157.1	58076	0	.00	227	227	116
TOTAL		50	2204.0	2488.1	14836	2				452

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING IAX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS RESTORATION HOURS (=AVG.) (▒=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
VALVES SHUTOFF,ISOLATION,STOP	.0416 .0418	1	23.95	11 11		
INSTRUMENTATION AND CONTROLS RECORDER	1.3217 1.7337	10	5.77	150 150		
INSTRUMENTATION AND CONTROLS INTEGRATOR (TOTALIZER)	.1935 .3859	2	5.18	4 4		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	35.7213 46.8515	229	4.69	926 926		
MOTORS LESS THAN 1 HP	.0003 .3781	1	2.65	4 4		
INSTRUMENTATION AND CONTROLS TRANSMITTER	.3316 .4173	1	2.40	1 1		
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	60.3662 82.5052	130	1.58	243 243		
INSTRUMENTATION AND CONTROLS OTHER	4.9188 9.6386	11	1.12	169 169		
ALL OTHERS	107.3709 144.7030	67	.46	7 7		

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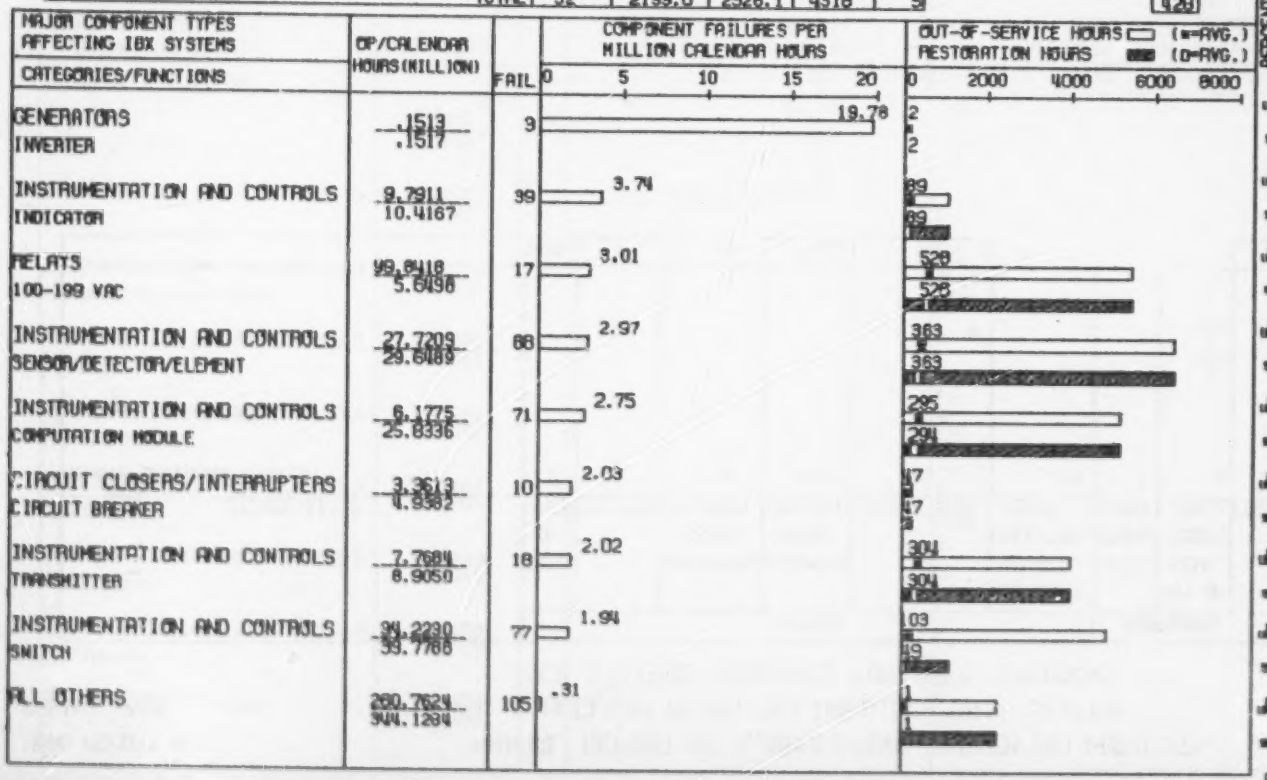
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBX ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR PROTECTION SYSTEM	GE	17	702.4	841.4	14014	3	3.57	115	115	140
REACTOR PROTECTION SYSTEM	B&W	7	272.2	340.5	16865	0	.00	20	24	20
SAFE FEATURES ACTUAT. SYS.	B&W	7	273.8	340.0	9982	0	.00	207	207	43
REACTOR PROTECTION SYSTEM	CE	3	124.4	136.6	13540	0	.00	118	200	51
ENGINEERED SAFETY FEATURE	CE	1	35.4	35.4	4506	0	.00	17	17	18
REACTOR PROTECTIVE LOGIC	WEST	17	790.8	832.2	45411	2	2.40	371	371	156
	TOTAL	52	2199.0	2526.1	4318	5				428



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ICX SYSTEMS REQUIRED FOR SAFE SHUTDOWN

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REMOTE SHUTDOWN SYSTEM	GE	2	.8	75.3	32	0	.00	0	0	0
TOTAL		2	.8	75.3	32	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEX OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTROL ROOM PANELS	GE	10	491.0	491.0	24894	0	.00	216	216	1
LOCAL PANELS AND RACKS	GE	6	290.8	292.0	0	0	.00	0	0	0
INTEGRATED CONTROL SYSTEM	B&W	2	39.2	77.5	6	0	.00	0	0	0
NON-NUCLEAR INSTRU.	B&W	5	258.0	259.9	14167	0	.00	462	462	17
OPERATING CONTROL STATIONS	CE	1	55.1	57.2	12	0	.00	0	0	0
NON-NUCLEAR PROCESS INSTR.	CE	1	29.4	35.4	4414	0	.00	0	0	0
PROCESS PROTECTION INSTR.	WEST	4	206.2	217.0	21336	0	.00	174	174	18
CONTROL BOARDS AND PANELS	WEST	2	83.6	85.7	0	0	.00	0	0	0
	TOTAL	31	1453.3	1515.7	64829	0				36

MAJOR COMPONENT TYPES AFFECTING IEX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 1500 3000 4500 6000)
PUMPS UNDER 500 GPH	.0657 / .0659	1	15.18	432 / 432 / 0
INSTRUMENTATION AND CONTROLS OTHER	.0295 / .0677	1	14.76	1 / 1 / 0
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	11.0376 / 11.7954	18	1.53	216 / 216
INSTRUMENTATION AND CONTROLS RECORDER	1.0074 / 1.0410	1	.96	4956 / 4956 / 0
INSTRUMENTATION AND CONTROLS TRANSMITTER	2.3785 / 2.8792	2	.69	174 / 174
INSTRUMENTATION AND CONTROLS INDICATOR	13.5858 / 14.5995	6	.41	198 / 198
INSTRUMENTATION AND CONTROLS POWER SUPPLY	11.0480 / 11.5213	2	.17	55 / 55 / 0
INSTRUMENTATION AND CONTROLS CONTROLLER	17.6900 / 18.5585	2	.11	76 / 76 / 0
ALL OTHERS	95.0075 / 118.6683	3	.09	3 / 3

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM				ON PLANT			
	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
PERCENT												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IFX OTHER INSTR. SYS. NOT REQUIRED FOR SAFETY

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
IN-CORE INSTRUMENTATION	B&W	4	201.0	201.0	7625	0	.00	0	0	0
IN-CORE INSTRUMENTATION	CE	1	33.0	44.1	5810	0	.00	0	0	0
	TOTAL	5	234.0	245.1	13435	0				0

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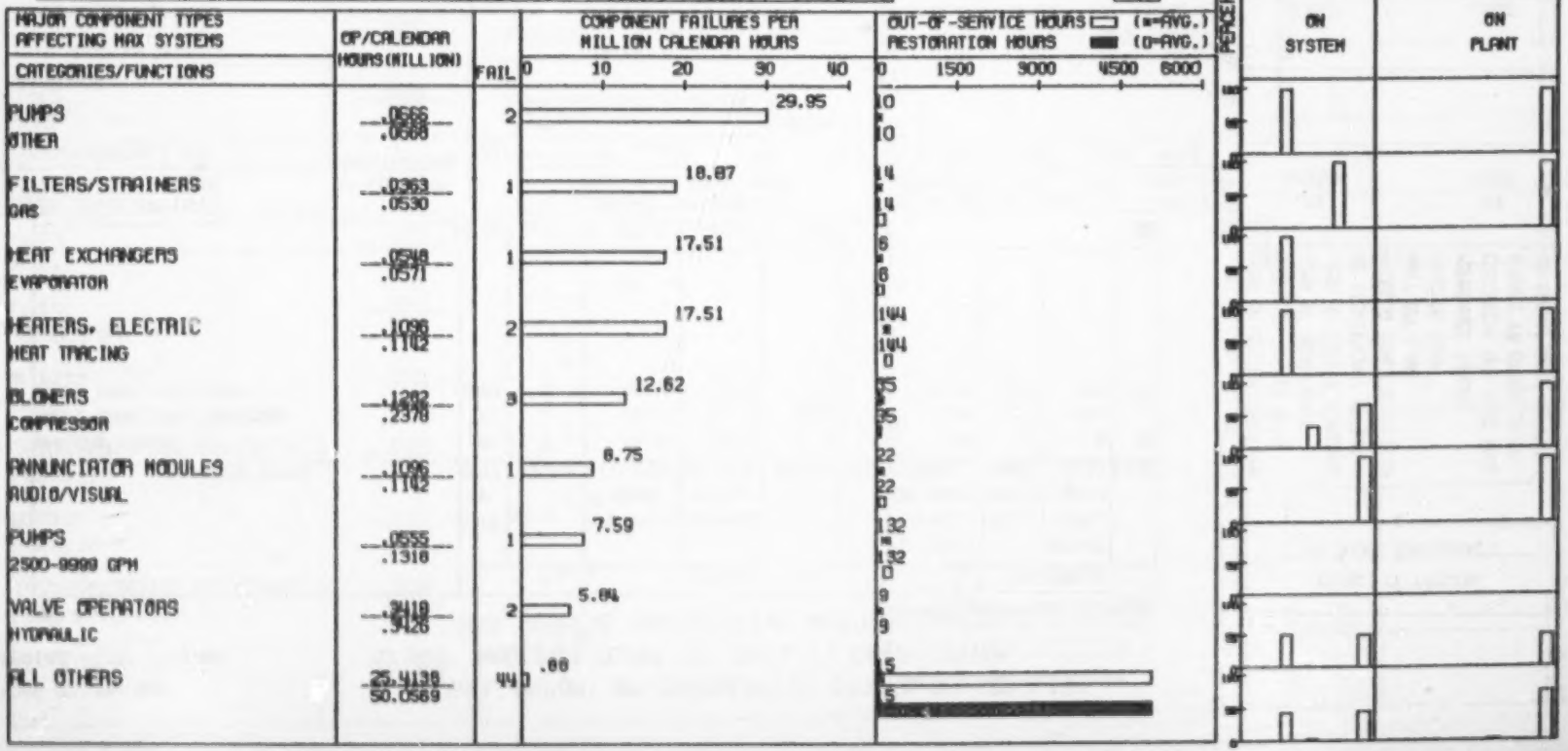
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MAX LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RAD. WASTE DISPOSAL SYS.	GE	7	345.2	360.2	10086	0	.00	176	176	8
WASTE DISPOSAL SYSTEM	B&W	10	350.0	477.5	4560	0	.00	101	101	14
WASTE MANAG.SYS.(LIQUID)	CE	4	149.8	202.4	11595	0	.00	656	658	19
WASTE PROC. SYS (LIQUID)	WEST	13	582.0	626.0	26954	2	3.19	912	912	16
EQUIPMENT DRAIN SYS.	WEST	4	147.5	162.6	14220	0	.00	0	0	0
TOTAL		38	1574.5	1848.7	67415	2				57



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MBX GASEOUS RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
OFF-GAS SYSTEM	GE	2	66.4	109.8	0	0	.00	0	0	0
WASTE MANAG.SYS.(GASEOUS)	CE	2	92.4	92.4	4420	0	.00	1697	1697	1
WASTE PROC. SYS (GAS)	WEST	3	95.3	128.2	5	3	23.40	233	239	27
TOTAL		7	274.1	330.4	4425	3				28

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING MBX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (*=AVG.) RESTORATION HOURS (□=AVG.) (0 1500 3000 4500 6000)	PERCENT: ON SYSTEM	PERCENT: ON PLANT
BLOWERS COMPRESSOR	.1358 / .2258	7	30.98	108 / 108		
VALVES PRESSURE CONTROL	.4282 / .4358	4	9.18	75 / 75		
RECOMBINERS AIR	.0000 / .1277	1	7.83	1697 / 1697		
MOTORS 25-99.9 HP	.1096 / .1758	1	5.69	320 / 320		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.8191 / .8474	2	2.36	2248 / 2248		
VALVES SHUTOFF.ISOLATION.STOP	1.6714 / 2.7878	6	2.15	40 / 40		
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.5914 / 2.2085	4	1.81	33 / 33		
INSTRUMENTATION AND CONTROLS INDICATOR	.8159 / 1.0087	1	.99	6 / 6		
ALL OTHERS	5.6882 / 8.6677	2	.23	9 / 9		

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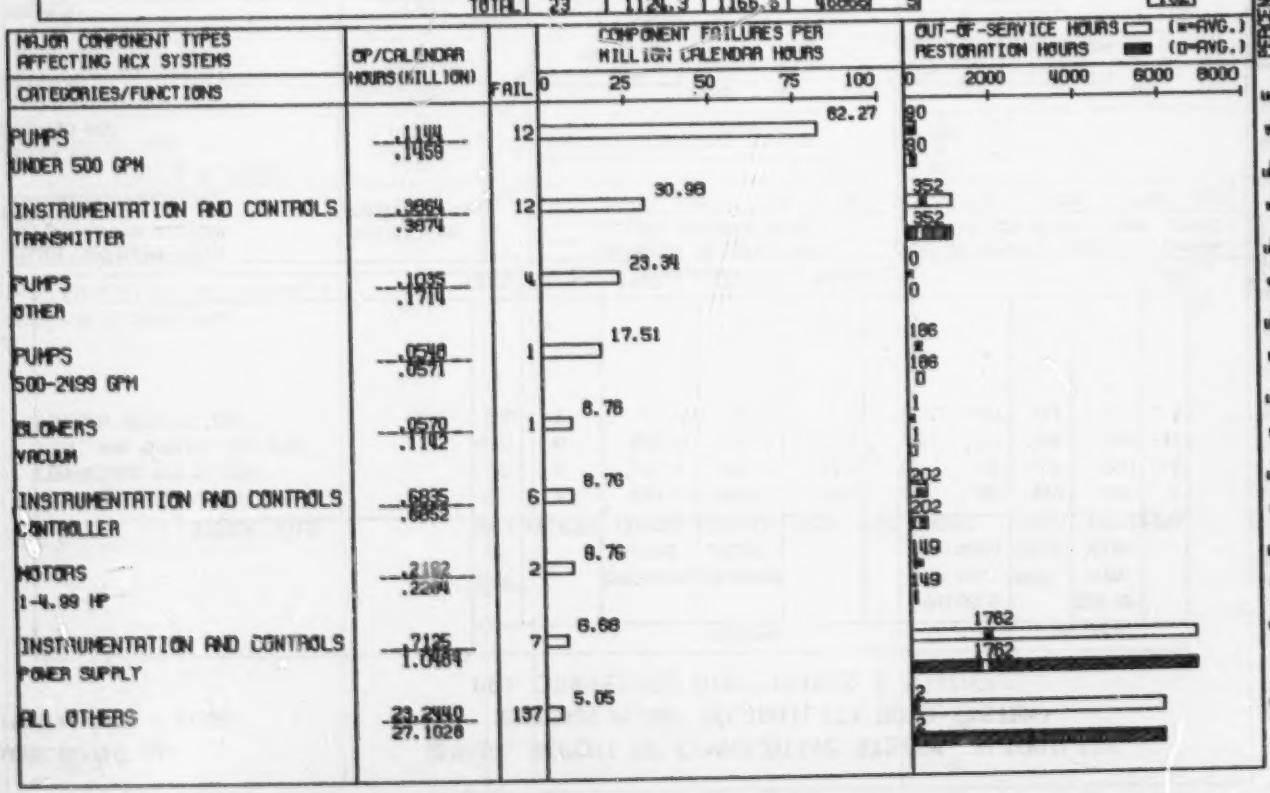
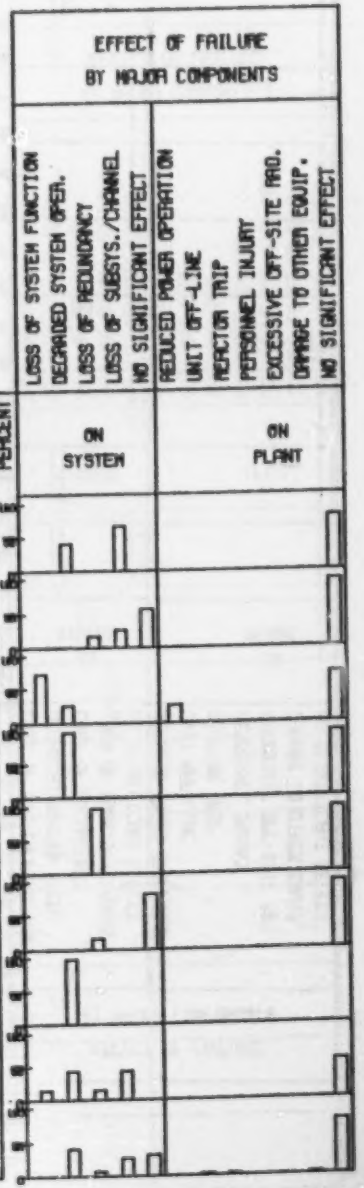
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MCX PROCESS & EFFLUENT RAD. MONITORING SYS.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
PROCESS RAD. MONIT. SYS.	GE	14	696.4	716.7	16100	3	4.19	61	61	59
RADIATION MONITORING SYS.	CE	2	90.5	101.6	7954	0	.00	245	245	33
RADIATION MONIT. SYS.	WEST	7	337.4	348.3	22812	2	5.74	444	444	90
TOTAL		23	1124.3	1166.6	46866	5				182





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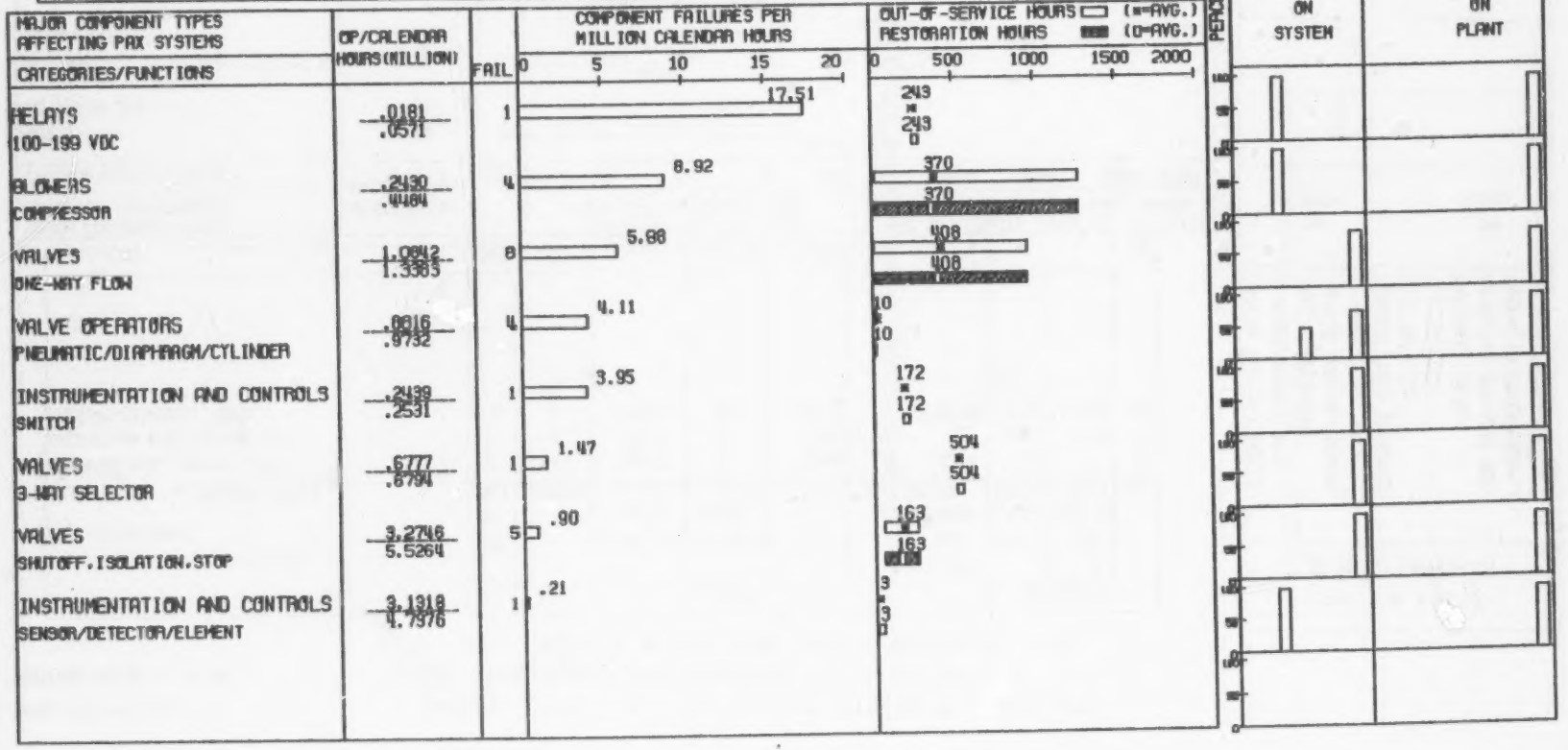
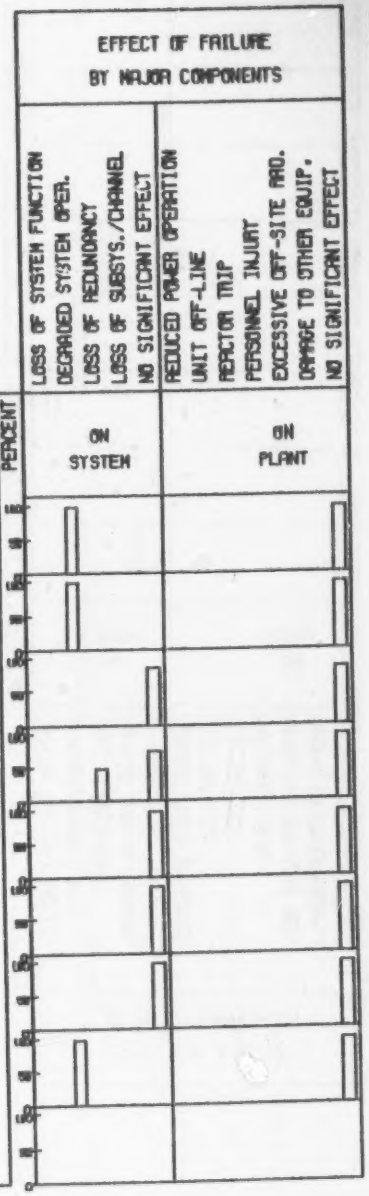
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PAX COMPRESSED AIR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
INSTRUMENT/SERV. AIR SYS.	GE	9	489.9	497.8	6590	0	.00	466	466	7
COMPRESSED AIR SYSTEM	CE	6	309.2	325.1	9225	0	.00	201	201	4
INST. AND SERVICE AIR SYS.	WEST	8	421.4	423.3	14256	0	.00	166	166	11
STATION SERVICE AIR	B&W	1	27.7	27.7	0	0	.00	211	211	3
	TOTAL	24	1248.2	1273.9	30071	0				25





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PBX PROCESS SAMPLING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SAMPLING SYSTEM	GE	1	57.0	57.0	78	0	.00	0	0	0
SAMPLING SYSTEM	CE	4	155.9	202.0	8093	0	.00	226	226	1
SAMPLING SYSTEM	WEST	2	21.8	68.2	0	0	.00	466	466	3
	TOTAL	7	234.7	327.2	8171	0				4

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING PBX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 200 400 600 800)
VALVE OPERATORS	.0002 / .0496	1	20.16	226 ■ 226 □
MECH. (DIFF.PRES.TO S/S FORCE CL)				
VALVES	.0549 / .0878	1	11.38	2 ■ 2 □
SAMPLE				
INSTRUMENTATION AND CONTROLS	.4932 / .6022	2	9.32	698 ■ 698 □
SENSOR/DETECTOR/ELEMENT				

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCX CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STANDBY LIQUID CNTRL. SYS.	GE	18	140.3	869.5	35519	0	.00	435	435	42
MAKEUP AND PURIF. SYSTEM	B&W	7	274.4	319.8	98	0	.00	473	473	81
CHEMICAL ADDITION SYSTEM	B&W	4	123.3	163.8	49	0	.00	594	594	3
BORATED WATER STORAGE TANK	B&W	1	15.7	27.4	1296	0	.00	503	503	2
CHEMICAL & VOL.CONTR.SYS.	CE	10	389.7	430.3	23832	0	.00	413	413	204
CHEMICAL & VOL. CONT. SYS.	WEST	20	857.9	972.0	37668	5	5.14	432	432	565
BORON RECYCLE SYSTEM	WEST	1	11.4	47.9	0	0	.00	284	284	2
TOTAL		61	1812.7	2830.7	98450	5				899

MAJOR COMPONENT TYPES AFFECTING PCX SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 50 100 150 200)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 2500 5000 7500 10000)
HEAT EXCHANGERS EVAPORATOR	.0027 / .0571	9	157.56	38 / 38
MECHANICAL FUNCTION UNITS PUMP CONTROL	.1054 / .3953	34	86.00	230 / 230
PUMPS UNDER 500 GPM	3.5513 / 9.0299	399	44.19	244 / 244
PUMPS 2500-9999 GPM	.0196 / .0308	1	32.48	26 / 26
VALVE OPERATORS ELECTRIC MOTOR-DC	.0000 / .1094	1	9.14	4 / 4
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.3374 / .8078	6	7.43	506 / 506
VALVES PRESSURE RELIEF	6.9190 / 9.1913	57	6.20	887 / 887
VALVES SHUTOFF, ISOLATION, STOP	20.8843 / 23.8456	129	5.41	825 / 824
ALL OTHERS	223.8219 / 315.7465	263	.83	2 / 2

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PEX OTHER AUXILIARY PROCESS SYSTEMS & THEIR COM.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AUXILIARY STEAM SYS.	WEST	2	17.5	71.2	55	0	.00	4	4	3
TOTAL		2	17.5	71.2	55	0				3

MAJOR COMPONENT TYPES AFFECTING PEX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 5 10 15 20)
VALVE OPERATORS ELECTRIC MOTOR-DC	.0004 / .0405	1	24.68	
MOTORS 1-4.99 HP	.0003 / .0810	1	12.34	
VALVES SHUTOFF,ISOLATION,STOP	.0261 / .0810	1	12.34	

EFFECT OF FAILURE BY MAJOR COMPONENTS

	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF 2/3STS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
	ON SYSTEM					ON PLANT						

PERCENT: 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

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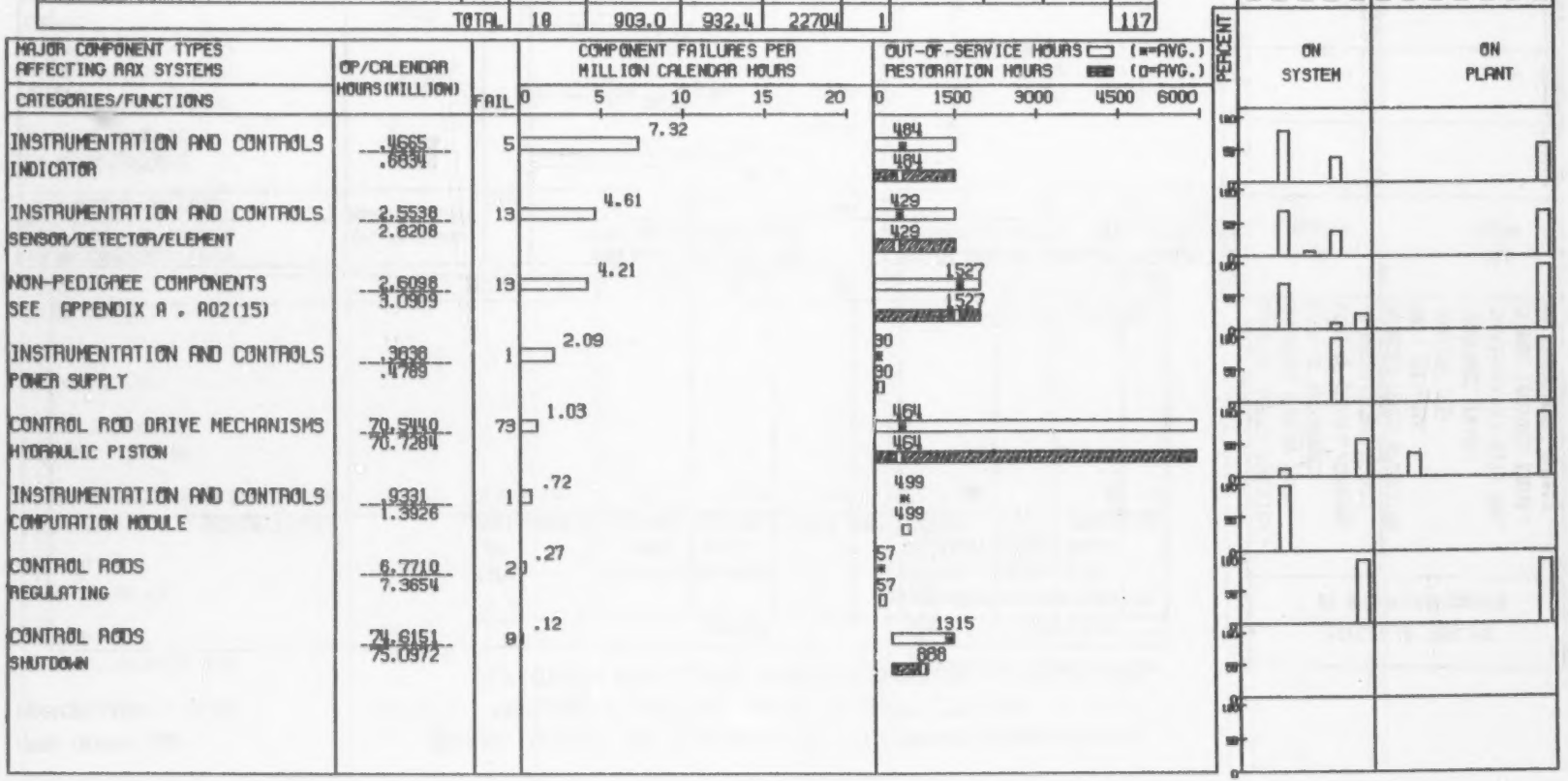
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RAX REACTOR VESSEL INTERNALS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR ASSEMBLY	GE	13	658.2	666.3	22698	1	1.50	496	522	90
REACTOR INTERNALS	B&W	1	48.9	50.6	6	0	.00	0	0	0
IN-CORE EQUIPMENT	WEST	4	195.9	215.5	0	0	.00	1008	1008	27
TOTAL		18	903.0	932.4	22704	1				117



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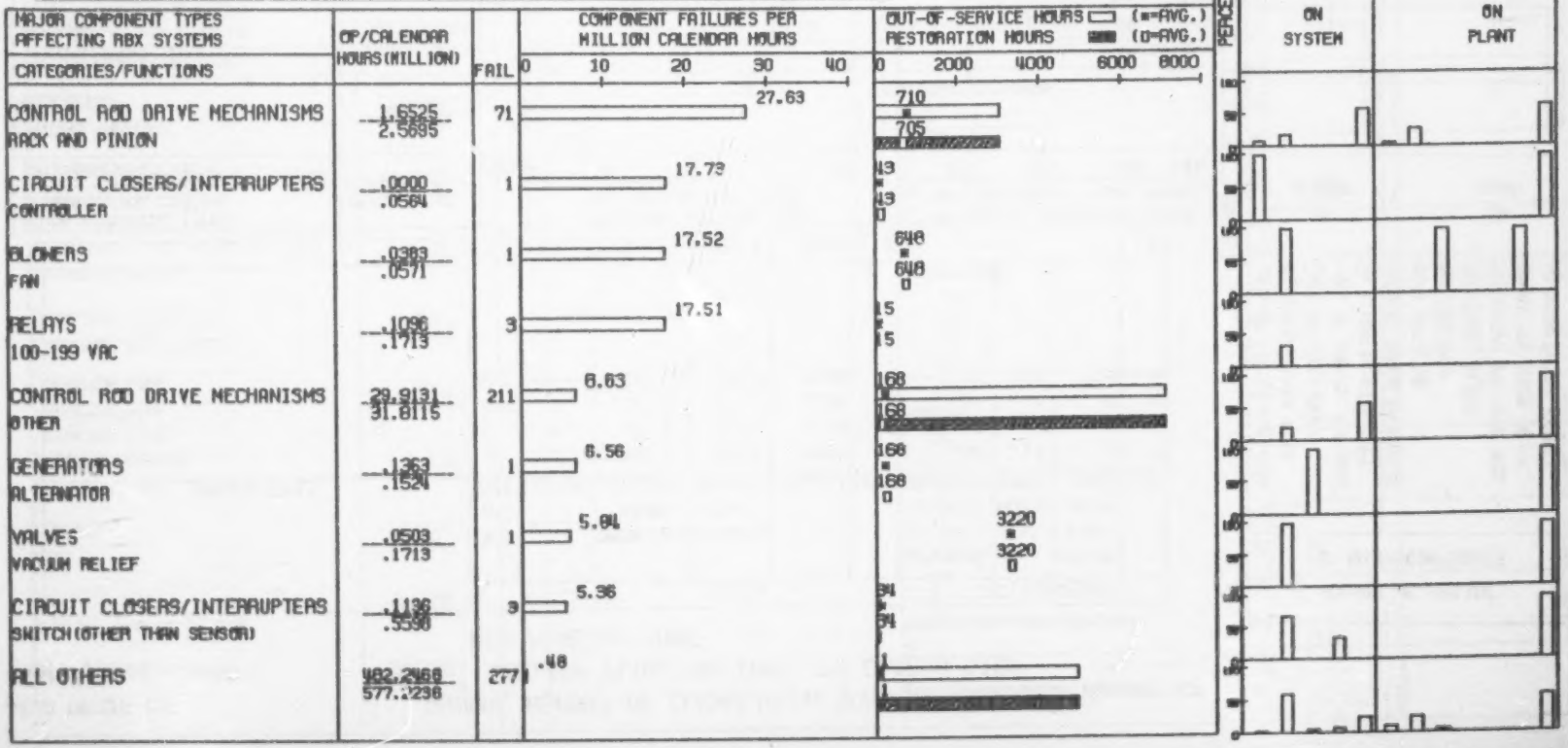
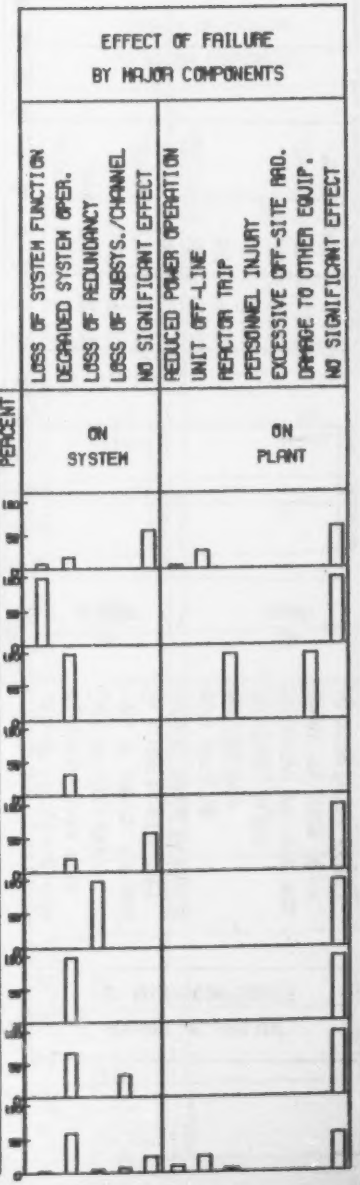
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RBX REACTIVITY CONTROL SYSTEMS

SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	SYSTEM OPERATING HOURS (X1000)	SYSTEM CALENDAR HOURS (X1000)	SYSTEM TESTS	SYSTEM FAIL	SYSTEM FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONTROL ROD DRIVE HYD.SYS.	GE	19	835.8	924.4	48691	2	2.16	189	189	307
CONTROL ROD DRIVE SYSTEM	B&W	8	342.5	393.5	18606	1	2.54	278	278	79
CONTROL ROD DRIVE MECH.	CE	3	108.1	136.6	6453	5	36.60	638	638	79
ROD CLUSTER CONTROL SYS.	WEST	20	918.5	1021.1	54019	6	5.88	316	316	104
TOTAL		50	2204.9	2475.6	27769	14				569





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RCX REACTOR CORE

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
FUEL & RELOADS	GE	14	635.9	745.4	6847	0	.00	0	0	0
REACTOR CORE	CE	4	127.5	165.5	2033	0	.00	0	0	0
REACTOR CORE	B&W	7	240.4	327.4	2790	0	.00	0	0	0
REACTOR CORE	WEST	15	667.0	750.5	8969	0	.00	224	224	6
TOTAL		40	1670.8	1988.8	20639	0				6

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING RCX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 500 1000 1500 2000)	PERCENT	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
						ON SYSTEM					ON PLANT						
CONTROL RODS REGULATING	3.9276 / 4.0758	5	1.23	264 / 264	5												
CONTROL RODS SHUTDOWN	5.7036 / 6.9455	1	.14	24 / 24	4												
					3												
					2												
					1												
					0												

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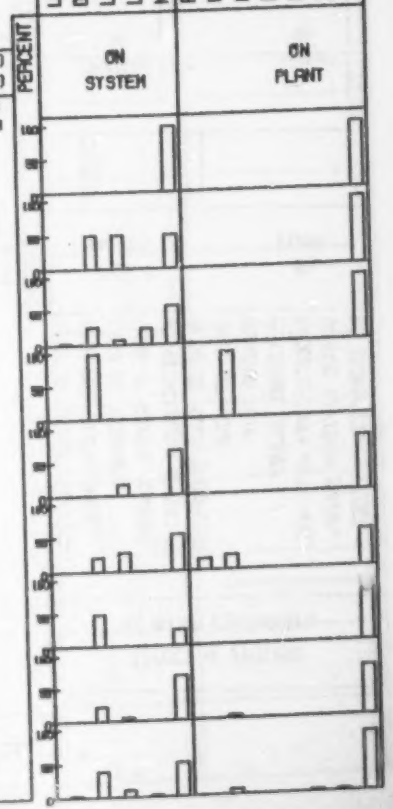
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SAX REACTOR CONTAINMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CONT. & PRESS. SUPP. SYS.	GE	18	811.6	893.4	10973	2	2.24	371	371	157
REACTOR BLDG. PENETRATIONS	B&W	6	220.5	278.1	175	0	.00	651	651	37
CONTAINMENT SYSTEM.	WEST	18	769.8	876.9	15421	0	.00	135	135	61
CONTAINMENT SYSTEM, INCL. PENETRATIONS	CE	9	274.0	398.3	11628	0	.00	339	339	20
	TOTAL	51	2075.9	2446.7	38197	2				275

MAJOR COMPONENT TYPES AFFECTING SAX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 1500 3000 4500 6000)
VALVES 3-WAY SELECTOR	.2278 / .2655	4	14.01	8 / 8
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.3122 / .3303	4	12.11	26 / 26
PENETRATIONS, PRIMARY CONT. PERSONNEL ACCESS	4.1691 / 4.5951	40	8.70	80 / 80
PRESSURE VESSELS PRESSURE SUPPRESSION	.1041 / .1208	1	8.28	899 / 899
VALVES ONE-WAY FLOW	.7652 / 1.0141	6	5.92	708 / 708
VALVES VACUUM RELIEF	4.1656 / 5.1196	24	4.69	501 / 501
VALVES VENT	.8058 / .8945	4	4.47	551 / 551
VALVES SHUTOFF, ISOLATION, STOP	9.6246 / 14.3696	63	4.38	547 / 547
ALL OTHERS	140.0605 / 183.2308	128	.70	2 / 2

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SBX CONTAINMENT HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONT. ATMOSP. COOL. SYS.	GE	5	230.7	262.7	7026	0	.00	287	287	58
REACTOR BLDG. COOLING SYS.	B&W	8	361.2	392.8	7379	0	.00	613	613	6
CONTAINMENT EMERG. COOLING	CE	3	107.7	118.0	179	0	.00	5706	5706	4
CONTAINMENT VENT. SYSTEM	WEST	18	736.3	885.0	18058	1	1.13	303	303	114
	TOTAL	34	1435.9	1658.5	32642	1				182

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING SBX SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 2000 4000 6000 8000)	PERCENT: ON SYSTEM	ON PLANT
PENETRATIONS, PRIMARY CONT. ELECTRICAL	.0276 / .0394	1	25.40	8 / 6		
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.4885 / 1.6254	32	19.69	145 / 145		
VALVE OPERATORS MECH.(DIFF.PRES.TO O/S FORCE CL)	.0925 / .1102	2	17.51	6312 / 6312		
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.0548 / .7261	7	9.64	214 / 214		
VALVE OPERATORS ELECTRIC MOTOR-DC	.0826 / .1493	1	6.70	85 / 85		
ANNUNCIATOR MODULES AUDIO/VISUAL	.1373 / .1639	1	6.10	96 / 96		
INSTRUMENTATION AND CONTROLS RECORDER	1.2053 / 1.3378	8	5.98	83 / 83		
VALVES SHUTOFF,ISOLATION,STOP	7.4129 / 10.7678	41	3.81	484 / 484		
ALL OTHERS	35.0875 / 63.6646	69	1.40	5 / 5		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCX CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONT. ATMOSP. CONTROL SYS.	GE	11	351.3	576.5	8480	2	3.47	359	359	17
REACTOR BLDG.PURGE&VENT SYSTEMS	B&W	7	146.8	322.3	2258	0	.00	210	210	92
REACTOR BLDG. SPRAY SYS.	B&W	7	51.4	365.6	99	0	.00	124	248	26
CONTAINMENT SPRAY SYSTEMS	CE	7	90.3	291.4	11970	0	.00	1209	1208	12
CONTAINMENT SPRAY SYSTEM	WEST	20	91.9	946.1	22749	0	.00	225	225	33
ANNULUS VENT SYSTEM	WEST	2	.3	85.0	43	0	.00	670	670	5
CONTAINMENT AIR RET. SYS.	WEST	4	197.4	199.5	10869	0	.00	682	682	5
	TOTAL	58	929.4	2786.4	56468	2				190

MAJOR COMPONENT TYPES AFFECTING SCX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 2000 4000 6000 8000)
VALVE OPERATORS MECH.(DIFF.PRES.TO O/S FORCE CL)	.2313 .3937	6	15.01	217 217
BLOWERS VENTILATOR	.0709 .1060	1	9.43	200 200
ENGINES, INTERNAL COMBUSTION DIESEL OR NO.2 FUEL OIL	.0574 .1692	1	5.81	59 59
PUMPS UNDER 500 GPM	.1092 .7520	3	4.10	62 62
HEAT EXCHANGERS COOLER	.7369 1.3780	5	3.63	682 682
PUMPS 500-2499 GPM	.2041 1.9875	7	3.52	92 92
BLOWERS COMPRESSOR	.0012 .2895	1	3.45	249 249
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	3.9328 9.1816	26	2.69	109 109
ALL OTHERS	117.0538 204.3614	140	.69	9 9

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SOX CONTAINMENT ISOLATION SYSTEMS & CONTROLS

SYSTEM TITLE	TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
FLUID BLOCK SYSTEM	B&W	2	60.8	60.8	2322	0	.00	68	68	10
CONTAINMENT ISOLATION SYS.	WEST	11	424.1	562.8	14689	0	.00	364	364	81
CONTNMT ISOL SYS & CONTRL	GE	3	49.5	149.5	109	0	.00	255	255	26
	TOTAL	16	534.4	773.1	17120	0				117

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT

REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING SOX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 20 40 60 80)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 1000 2000 3000 4000)	PERCENT: ON SYSTEM	PERCENT: ON PLANT
PENETRATIONS, PRIMARY CONT. PERSONNEL ACCESS	.0252 .0306	2	65.04	28 28		
BLOWERS GAS CIRCULATOR	.0963 .0686	3	43.75	51 51		
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.2555 .2561	6	23.43	86 86		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.4672 .5142	6	11.67	104 104		
VALVES ONE-WAY FLOW	.5813 1.3104	14	10.68	111 111		
VALVES PRESSURE RELIEF	.1496 .2480	2	8.07	1324 1324 0		
MOTORS 1-4.99 HP	.0425 .1511	1	6.62	81 81		
INSTRUMENTATION AND CONTROLS SWITCH	3.5199 3.5207	11	3.12	30 30		
ALL OTHERS	34.9860 57.2898	72	1.26	6 6		

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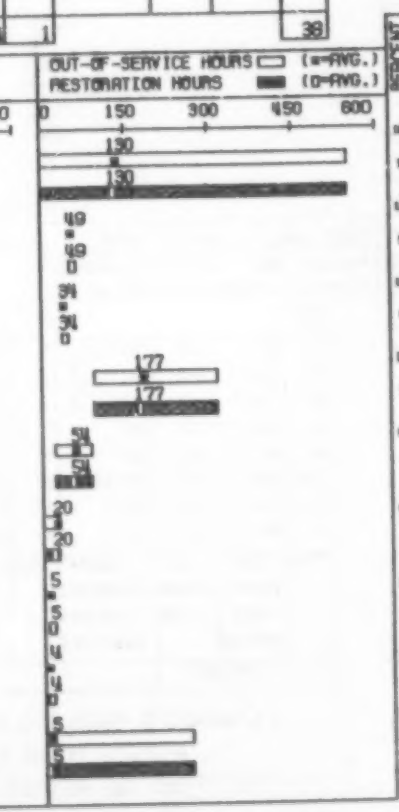
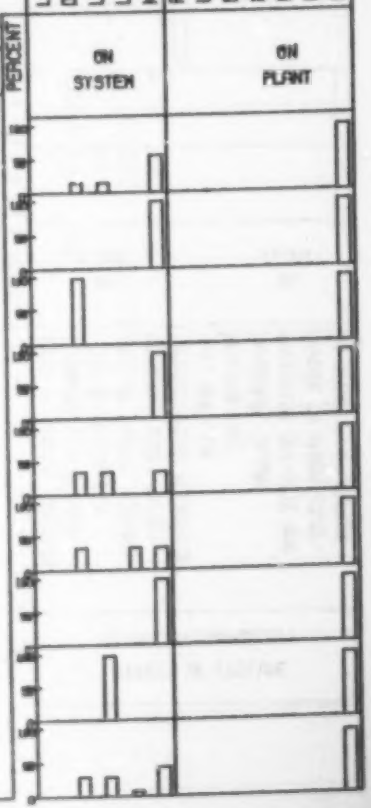
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SEX CONTAIN. COMBUSTIBLE GAS CONT. SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
STANDBY GAS TREATMENT SYS.	GE	17	292.5	851.3	28757	1	1.17	70	70	29
NITROGEN GAS SYSTEM	CE	5	180.6	251.1	13580	0	.00	218	218	2
CONT.COMB.GAS CONTROL SYS.	B&W	1	.2	27.5	12	0	.00	149	149	2
CONT.COMB.GAS CONTROL SYS.	WEST	13	90.9	575.2	375	0	.00	139	139	5
TOTAL		36	564.2	1705.1	42724	1				38

MAJOR COMPONENT TYPES AFFECTING SEX SYSTEMS CATEGORIES/FUNCTIONS	OF/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS
BLOWERS FAN	.1619 1.4729	7	4.75
INSTRUMENTATION AND CONTROLS RECORDER	.0462 .2680	1	3.73
VALVES 3-WAY SELECTOR	.3918 .3997	1	2.50
VALVES ONE-WAY FLOW	1.0175 1.2658	3	2.37
RELAYS 100-199 VAC	.0002 2.1058	3	1.42
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.4252 2.8251	3	1.09
INSTRUMENTATION AND CONTROLS SWITCH	.5298 .9728	1	1.03
HEATERS, ELECTRIC OTHER	.3010 1.0504	1	.95
ALL OTHERS	17.1110 30.2701	10	.48





EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFX EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
LOW PRESS. COOL. INJ. SYS.	GE	12	49.0	616.4	8059	1	1.62	129	129	67
CORE SPRAY SYSTEM	GE	18	45.9	892.7	13654	1	1.12	453	453	101
HIGH PRESS. COOL. INJ.SYS.	GE	14	.6	695.6	20594	13	18.69	238	238	206
HIGH PRESS. INJ. SYSTEM	B&W	5	163.7	251.5	137	0	.00	778	778	71
CORE FLOODING SYSTEM	B&W	7	.2	342.8	2492	0	.00	212	212	19
LOW PRESS. INJ. SYSTEM	B&W	3	49.1	173.9	2798	0	.00	501	501	44
SAFETY INJECTION SYSTEM	CE	8	155.8	346.1	24339	0	.00	587	587	82
SAFETY INJECTION SYSTEM	WEST	20	217.4	971.9	28289	2	2.06	615	615	160
	TOTAL	87	681.7	4292.9	362	17				750

MAJOR COMPONENT TYPES AFFECTING SFX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (=AVG.) / RESTORATION HOURS (=AVG.) (0 2500 5000 7500 10000)
GENERATORS	.2768 / .9683	20	50.46	96 / 96
INVERTER				
HEAT EXCHANGERS	.0001 / .5370	11	32.84	335 / 335
CONDENSER				
ANNUNCIATOR MODULES	.0378 / .0483	1	20.70	24 / 24
AUDIO/VISUAL				
VALVE OPERATORS	.2332 / 1.8143	19	10.47	909 / 909
SOLENOID-DC				
TURBINES	.0010 / .7375	7	9.49	78 / 78
1000-5000 HP				
MECHANICAL FUNCTION UNITS	.0000 / .3084	2	6.49	142 / 142
TURBINE CONTROL				
PUMPS	.0012 / 1.6560	9	4.84	155 / 155
500-2499 GPM				
VALVES	69.7198 / 90.9770	126	4.07	594 / 594
SHUTOFF.ISOLATION.STOP				
ALL OTHERS	281.8723 / 526.4941	555	1.05	1 / 1

EFFECT OF FAILURE BY MAJOR COMPONENTS

	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM												
ON PLANT												

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SGX CONTROL ROOM HABITABILITY SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONT.ROOM HABITABITY SYS.	B&W	1	27.5	28.2	12	0	.00	278	278	12
TOTAL		1	27.5	28.2	12	0				12

MAJOR COMPONENT TYPES AFFECTING SGX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 500 1000 1500 2000)
INSTRUMENTATION AND CONTROLS	.1091 / .1094	3	27.43	519 / 518
SENSOR/DETECTOR/ELEMENT				
VALVES	.0273 / .6015	7	11.64	210 / 210
SHUTOFF,ISOLATION,STOP				
HEAT EXCHANGERS	.0273 / .1094	1	9.14	116 / 116
CONDENSER				
VALVE OPERATORS	.5155 / .5468	1	1.83	196 / 196
PNEUMATIC/DIAPHRAGM/CYLINDER				

(■=AVG.) (▩=AVG.)

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT

PERCENT — ON SYSTEM — ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WAX STATION SERVICE WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SERVICE WATER SYSTEM	GE	10	392.2	524.6	21381	0	.00	173	173	15
LOW PRESS.SERV.WATER SYS.	B&W	7	339.5	354.2	7276	0	.00	260	260	38
SERVICE WATER SYSTEM	CE	6	254.9	266.0	16293	0	.00	531	531	31
SERVICE WATER SYSTEM	WEST	15	612.0	663.3	21752	0	.00	499	499	67
	TOTAL	38	1598.0	1808.1	66702	0				151

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING WAX SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (D=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
MOTORS	.0380	1	17.51	2279 = 2279 D		
OTHER	.0571					
FILTERS/STRAINERS	.0183	13	10.37	299		
LIQUID	1.2536			299		
PUMPS	.5880	13	5.71	650		
2500-9999 GPM	2.2749			650		
MOTORS	.1038	2	3.37	295		
1000-1999 HP	.5936			295		
MOTORS	.6217	7	3.26	235		
100-499 HP	2.1464			235		
PUMPS	.7051	3	2.79	425		
10,000-50,000 GPM	1.0748			425		
MOTORS	.5467	2	2.41	412		
500-999 HP	.8282			412		
PUMPS	.0884	1	2.29	1		
UNDER 500 GPM	.4371			1		
ALL OTHERS	95.9547	109	.60	4		
	182.7127			4		

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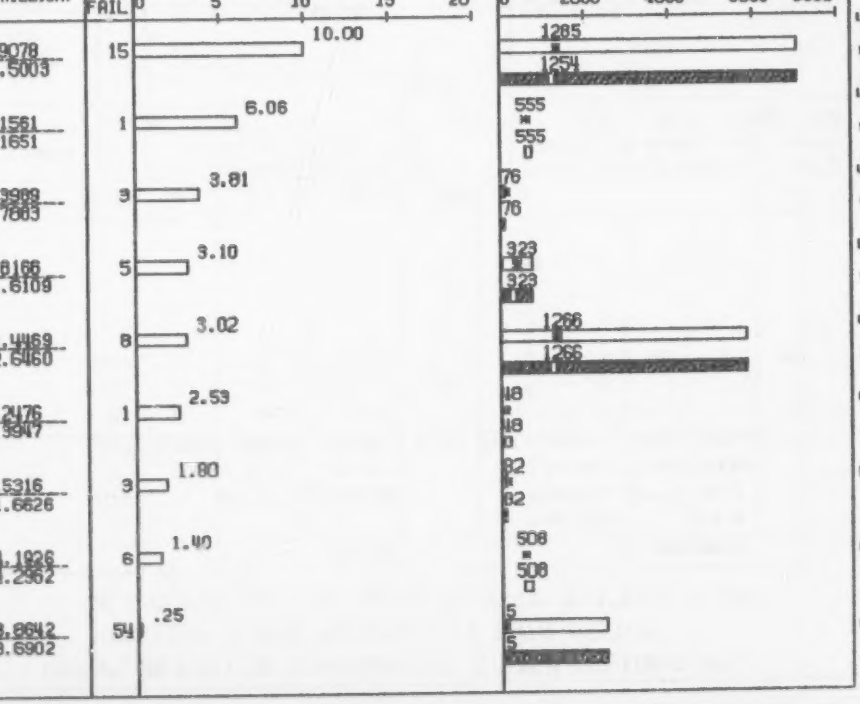
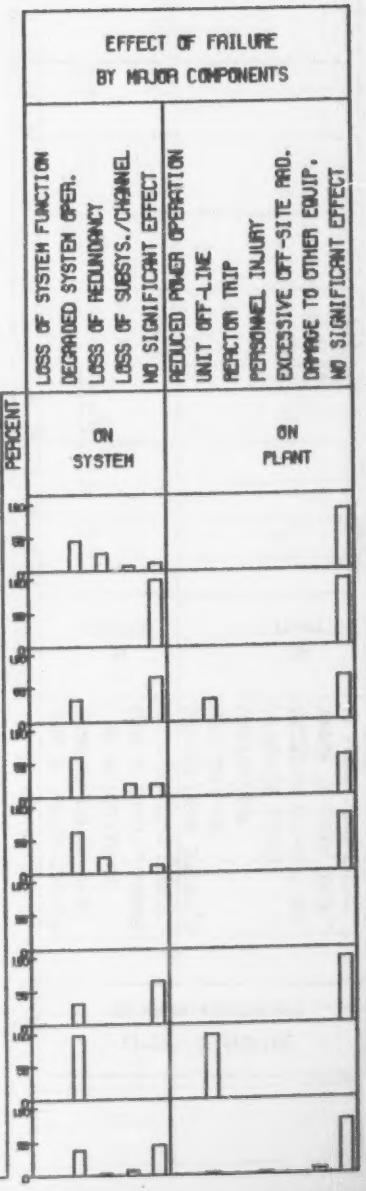
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WBX COOLING SYSTEMS FOR REACTOR AUXILIARIES & CON

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REAC.BLDG.CLOSED WTR. SYS.	GE	13	615.5	621.6	21391	0	.00	22	22	4
COMPONENT COOLING SYSTEM	B&W	11	352.0	501.4	4576	0	.00	172	172	28
COMPONENT COOLING SYSTEM	CE	6	382.0	407.5	11298	0	.00	600	617	27
COMPONENT COOLING SYSTEMS	WEST	18	787.9	844.6	14913	0	.00	737	737	37
	TOTAL	50	2137.4	2375.1	52118	0				96

MAJOR COMPONENT TYPES AFFECTING WBX SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL
PUMPS 2500-9999 GPM	.9078 / 1.5003	15
VALVE OPERATORS OTHER	.1561 / .1651	1
PUMPS UNDER 500 GPM	.3989 / .7603	9
MOTORS 100-499 HP	.8166 / 1.6109	5
HEAT EXCHANGERS COOLER	1.4469 / 2.6460	8
ANNUNCIATOR MODULES AUDIO/VISUAL	.2476 / .3947	1
MOTORS LESS THAN 1 HP	.5316 / 1.6626	3
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	4.1926 / 4.2962	6
ALL OTHERS	143.8642 / 213.6902	54





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WCX DEMINERALIZED WATER MAKE-UP SYSTEMS & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
MAKE-UP WATER SYSTEM	GE	2	88.7	114.8	0	0	.00	0	0	0
PRIMARY MAKEUP WATER SYSTEM	CE	2	95.2	101.1	4414	0	.00	0	0	0
MAKEUP WATER SYS.	WEST	3	144.0	171.0	14232	0	.00	481	481	55
	TOTAL	7	327.9	386.9	18646	0				55

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING WCX SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (n=AVG.) RESTORATION HOURS (O=AVG.)
MECHANICAL FUNCTION UNITS	.0548 / .0571	2	35.01	2343 / 2343
SPEED CHANGER				
PUMPS	.7778 / 1.8455	34	18.42	341 / 341
UNDER 500 GPM				
VALVES	.0548 / .1142	2	17.51	2820 / 2820
OTHER				
PUMPS	.0548 / .1142	1	8.76	42 / 42
500-2499 GPM				
MOTORS	.4361 / .9434	7	7.42	150 / 150
5-24.9 HP				
INSTRUMENTATION AND CONTROLS	.2083 / .2154	1	4.64	44 / 44
TRANSMITTER				
MOTORS	.8149 / 1.5992	6	3.75	525 / 525
LESS THAN 1 HP				
INSTRUMENTATION AND CONTROLS	.8767 / 1.0280	1	.97	2 / 2
CONTROLLER				
ALL OTHERS	13.6931 / 23.8870	1	.04	52 / 52

PERCENT — ON SYSTEM — ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WFX CONDENSATE STORAGE FACILITIES

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONDENSATE TRAN. &STRG. SYS.	GE	3	143.8	170.3	7020	0	.00	690	690	1
TOTAL		3	143.8	170.3	7020	0				1

MAJOR COMPONENT TYPES AFFECTING WFX SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▪=AVG.) (0 200 400 600 800)
VALVE OPERATORS	.0000	1	5.91	690
ELECTRIC MOTOR-AC	.1692			▪ 690 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WGX OTHER AUXILIARY WATER SYSTEMS & THEIR CONTROL

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CHILLED WATER SYSTEM	B&W	1	50.9	53.1	0	0	.00	0	0	0
TOTAL		1	50.9	53.1	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAA AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REAC.BLDG. HEAT/VENT/AC	GE	5	89.4	212.7	3781	0	.00	122	122	3
TOTAL		5	89.4	212.7	3781	0				3

MAJOR COMPONENT TYPES AFFECTING AAA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 100 200 300 400)
VALVE OPERATORS	.3301 / .3309	2	6.04	4 = 4
PNEUMATIC/DIAPHRAGM/CYLINDER				0
FILTERS/STRAINERS	.2015 / .2065	1	4.84	358 = 358
GAS				0

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
100		
90		
80		
70		
60		
50		
40		
30		
20		
10		
0		

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ABA FIRE PROTECTION SYSTEMS & CONTROLS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FIRE PROTECTION SYSTEM	GE	1	56.9	57.1	70	0	.00	0	0	0
TOTAL		1	56.9	57.1	70	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
BAA AREA MONITORING SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
AREA RAD. MOINT. SYS.	GE	2	109.6	109.7	150	0	.00	4	4	2
TOTAL		2	109.6	109.7	150	0				2

MAJOR COMPONENT TYPES AFFECTING BAA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.) (0 5 10 15 20)
INSTRUMENTATION AND CONTROLS	.1689 / .1689	2	11.84	4 / 4
INDICATOR				

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 5 10 15 20

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
BBA AIRBORNE RADIOACTIVITY MONITORING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PRIM.CONT.ATSMF. SYS.	GE	7	325.7	348.5	276	0	.00	376	378	28
TOTAL		7	325.7	348.5	276	0				28

MAJOR COMPONENT TYPES AFFECTING BBA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG. ■=D-AVG.) (0 1000 2000 3000 4000)
INSTRUMENTATION AND CONTROLS RECORDER	.3579 / .3599	19	36.12	216 / 216
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.0570 / .0571	1	17.51	25 / 25
INSTRUMENTATION AND CONTROLS TRANSMITTER	.2784 / .3021	5	16.55	14 / 14
PENETRATIONS, PRIMARY CONT. PROCESS PIPING	.3632 / .5258	3	5.71	978 / 976
VALVES SHUTOFF,ISOLATION,STOP	.8132 / .8774	4	4.09	337 / 337
INSTRUMENTATION AND CONTROLS INDICATOR	1.4694 / 1.4730	2	1.36	1672 / 1672

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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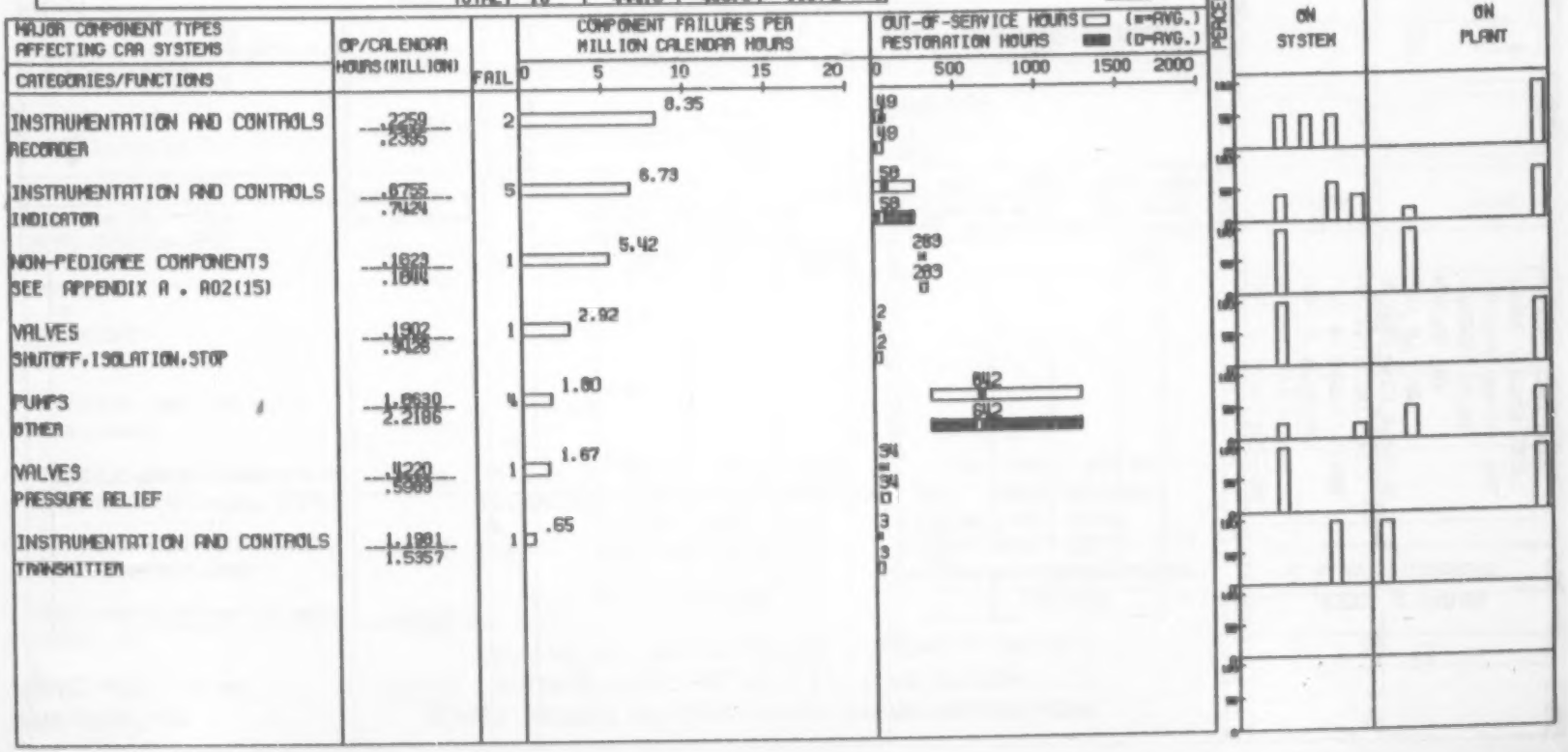
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CAA REACTOR VESSELS & APPURTENANCES

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR ASSEMBLY (VESSEL)	GE	10	444.0	489.0	11874	0	.00	218	218	15
TOTAL		10	444.0	489.0	11874	0				15



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBA COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NUCLEAR BOILER SYSTEM	GE	15	622.9	748.6	14784	0	.00	425	425	274
TOTAL		15	622.9	748.6	14784	0				274

MAJOR COMPONENT TYPES AFFECTING CBA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 2000 4000 6000 8000)
VALVES PRESSURE RELIEF	3.0016 / 4.3047	62	14.20	227 / 227
VALVE OPERATORS MECH.(DIFF.PRES.TO O/S FORCE CL)	.0000 / .7993	10	12.51	1537 / 1537
VALVES DRAIN	.0430 / 1.2496	9	7.24	1031 / 1031
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	1.2211 / 1.6821	13	6.91	339 / 339
VALVES ONE-WAY FLOW	1.3675 / 2.0311	19	5.35	940 / 940
VALVES SHUTOFF,ISOLATION,STOP	3.7561 / 6.7653	32	4.73	1540 / 1427
INSTRUMENTATION AND CONTROLS OTHER	.1795 / .2284	1	4.38	2 / 2
INSTRUMENTATION AND CONTROLS SWITCH	11.0035 / 14.0591	59	4.20	00 / 51
ALL OTHERS	81.4900 / 92.1422	75	.81	1 / 1

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBB COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR RECIRCULATION SYS.	GE	18	726.1	917.9	22236	2	2.18	508	508	118
TOTAL		18	726.1	917.9	22236	2				118

MAJOR COMPONENT TYPES AFFECTING CBB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 2000 4000 6000 8000) (=AVG.) (=AVG.)
PUMPS 10,000-50,000 GPM	1.3812 1.7276	18	10.42	197 197
GENERATORS GENERATOR	.4215 .5549	4	7.21	354 354
INSTRUMENTATION AND CONTROLS RECORDER	.7217 .8721	6	6.88	28 28
GENERATORS ALTERNATOR	.1839 .2152	1	4.65	3 3
MECHANICAL FUNCTION UNITS SPEED CHANGER	.1650 .2026	1	3.54	8 6
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	.2259 .8516	3	3.52	17 17
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	7.5580 8.3107	20	2.41	986 986
INSTRUMENTATION AND CONTROLS TRANSMITTER	5.0877 6.5662	11	1.66	187 187
ALL OTHERS	62.7160 79.0572	54	.68	1 1

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBC COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RECIRCULATION FLOW SYS.	GE	11	474.2	584.5	24780	1	1.71	63	63	7
TOTAL		11	474.2	584.5	24780	1				7

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING CBC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (▩=AVG.) (0 100 200 300 400)
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.0558 / .0584	1	17.73	2 ▩ 2 □
MOTORS 3000 HP AND OVER	.1076 / .1098	1	9.11	29 ▩ 23 □
INSTRUMENTATION AND CONTROLS RECORDER	.2071 / .2796	1	3.58	1 ▩ □
INSTRUMENTATION AND CONTROLS SWITCH	.5545 / .6105	2	3.28	38 ▩ 38 □
INSTRUMENTATION AND CONTROLS CONTROLLER	.3534 / .4568	1	2.19	328 ▩ 326 □
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.5625 / .6580	1	1.50	6 ▩ 6 □

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT: 0 10 20 30 40 50 60 70 80 90 100

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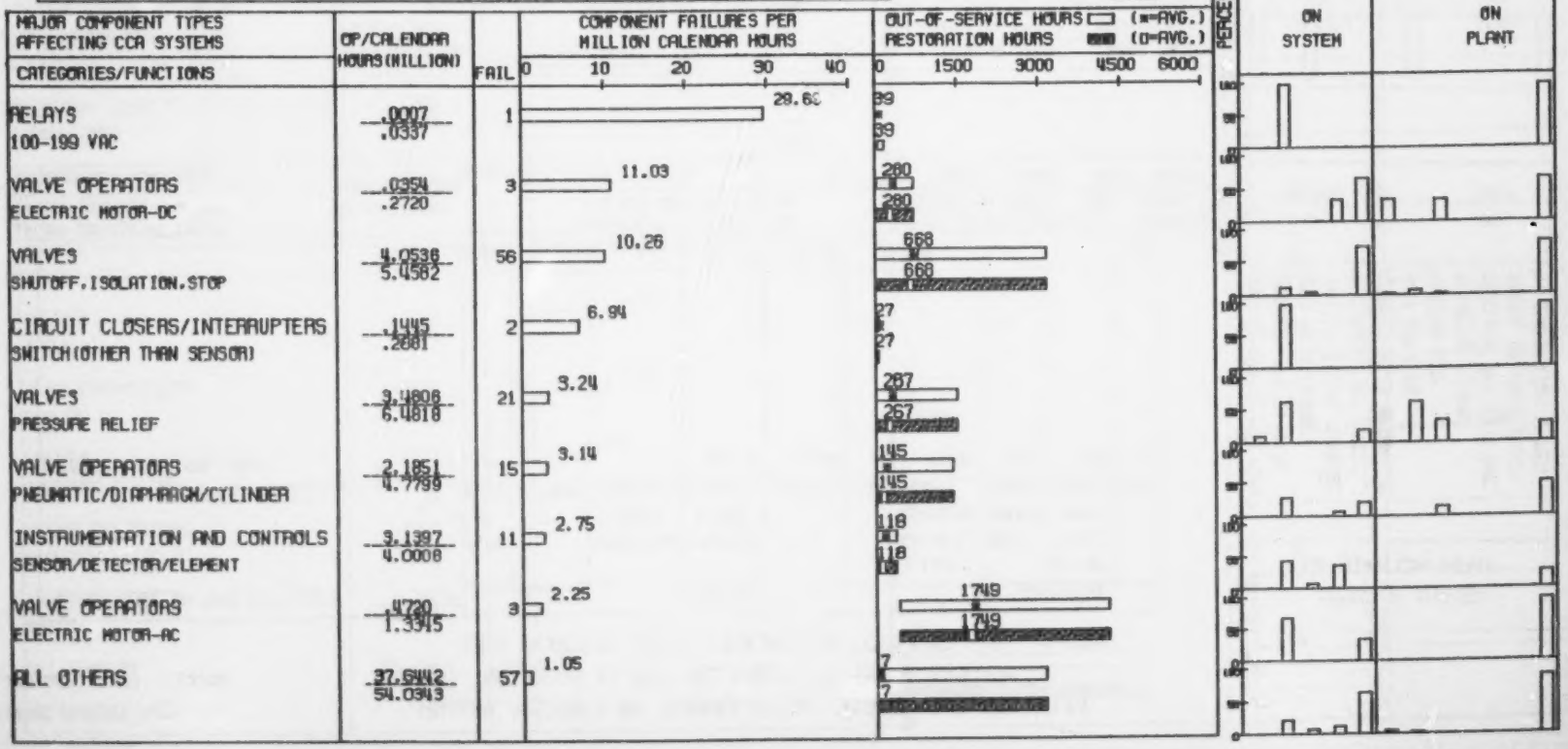
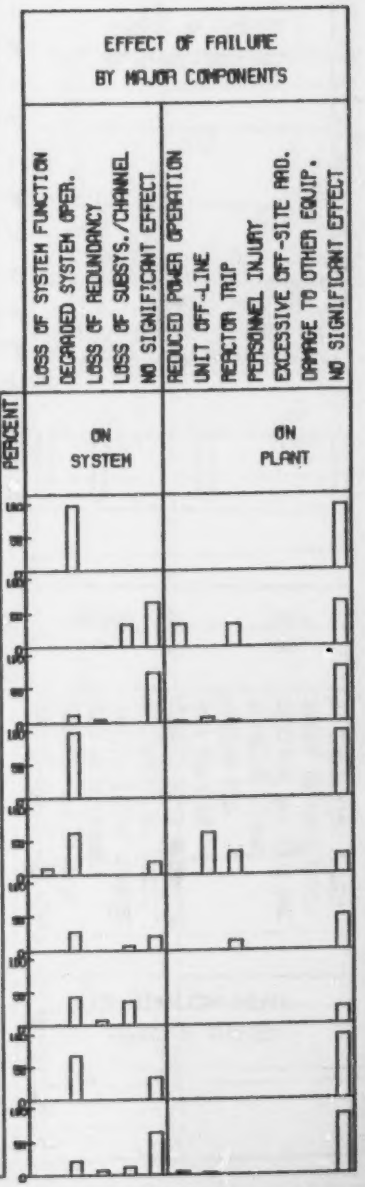
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CCA MAIN STEAM SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STEAM SYSTEM	GE	17	669.8	860.3	28905	3	3.49	441	441	169
TOTAL		17	669.8	860.3	28905	3				169





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CEA REACTOR CORE ISOLATION COOLING SYS. & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR CORE ISOL. SYS.	GE	13	1.4	661.2	18380	11	16.64	416	416	111
TOTAL		13	1.4	661.2	18380	11				111

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT

REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING CEA SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 2000 4000 6000 8000)	PERCENT ON SYSTEM	PERCENT ON PLANT
GENERATORS	.0124 / .0570	2	35.09	0 * 0		
INVERTER						
PUMPS	.0007 / .0659	1	15.17	341 * 341		
OVER 50,000 GPM				0		
TURBINES	.0008 / .2706	4	14.57	16 * 16		
LESS THAN 500 HP						
VALVE OPERATORS	.1074 / .1076	1	9.29	9 * 9		
SOLENOID-DC				0		
VALVE OPERATORS	.0000 / .1102	1	8.76	1381 * 1381		
HYDRAULIC				0		
MECHANICAL FUNCTION UNITS	.0000 / .9161	3	8.67	134 * 134		
TURBINE CONTROL				0		
TURBINES	.0011 / .3589	2	5.57	3 * 3		
500-999 HP				0		
VALVES	.0836 / .8568	3	3.50	817 * 817		
PRESSURE RELIEF				■		
ALL OTHERS	30.3239 / 83.7891	94	1.12	5 * 5		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CFA RESIDUAL HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RESIDUAL HEAT REMOVAL SYS.	GE	17	241.5	876.6	18045	1	1.14	345	345	196
TOTAL		17	241.5	876.6	18045	1				196

MAJOR COMPONENT TYPES AFFECTING CFA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 2000 4000 6000 8000)
CIRCUIT CLOSERS/INTERRUPTERS CONTACTOR	.1073 / .1076	2	18.59	10 / 10
PUMPS UNDER 500 GPM	.1022 / .8699	9	10.35	131 / 131
VALVES DRAIN	.1249 / .4129	4	9.69	550 / 550
VALVES OTHER	.1027 / .2051	1	4.87	15 / 15
HEAT EXCHANGERS COOLER	.7853 / 2.9950	14	4.67	295 / 295
VALVES PRESSURE CONTROL	.5151 / .7884	2	2.54	51 / 51
VALVE OPERATORS ELECTRIC MOTOR-DC	.3186 / 3.3044	7	2.12	355 / 355
INSTRUMENTATION AND CONTROLS SWITCH	6.1372 / 9.3471	16	1.71	9 / 9
ALL OTHERS	124.0829 / 222.6022	141	.63	9 / 9

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
80												
60												
40												
20												
0												

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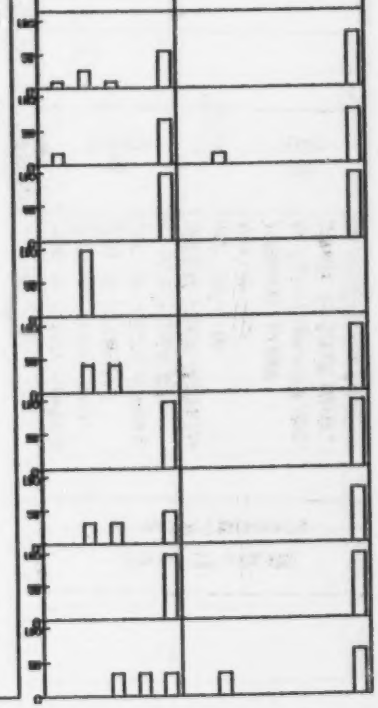
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CFB RESIDUAL HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
ISOLATION COND/AUX. SYS.	GE	6	14.7	303.3	11333	1	3.30	289	289	39
TOTAL		6	14.7	303.3	11333	1				39

MAJOR COMPONENT TYPES AFFECTING CFB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 1000 2000 3000 4000)
INSTRUMENTATION AND CONTROLS / TRANSMITTER	.7975 / .9093	11	12.10	4 / 4
VALVE OPERATORS / ELECTRIC MOTOR-AC	.2040 / .6787	6	8.84	54 / 54
VALVE OPERATORS / PNEUMATIC/DIAPHRAGM/CYLINDER	.2278 / .2548	2	7.85	3356 / 3356
HEAT EXCHANGERS / CONDENSER	.1370 / .6260	2	3.19	0 / 0
INSTRUMENTATION AND CONTROLS / SWITCH	.6812 / 1.6495	5	3.03	4 / 4
VALVE OPERATORS / ELECTRIC MOTOR-DC	.0898 / .4524	1	2.21	6 / 6
VALVES / SHUTOFF, ISOLATION, STOP	1.6868 / 3.0573	6	1.96	674 / 674
RELAYS / OVER 300 VAC	.7356 / 1.5462	3	1.94	7 / 7
ALL OTHERS	6.5113 / 8.0121	3	.37	2 / 2

EFFECT OF FAILURE BY MAJOR COMPONENTS



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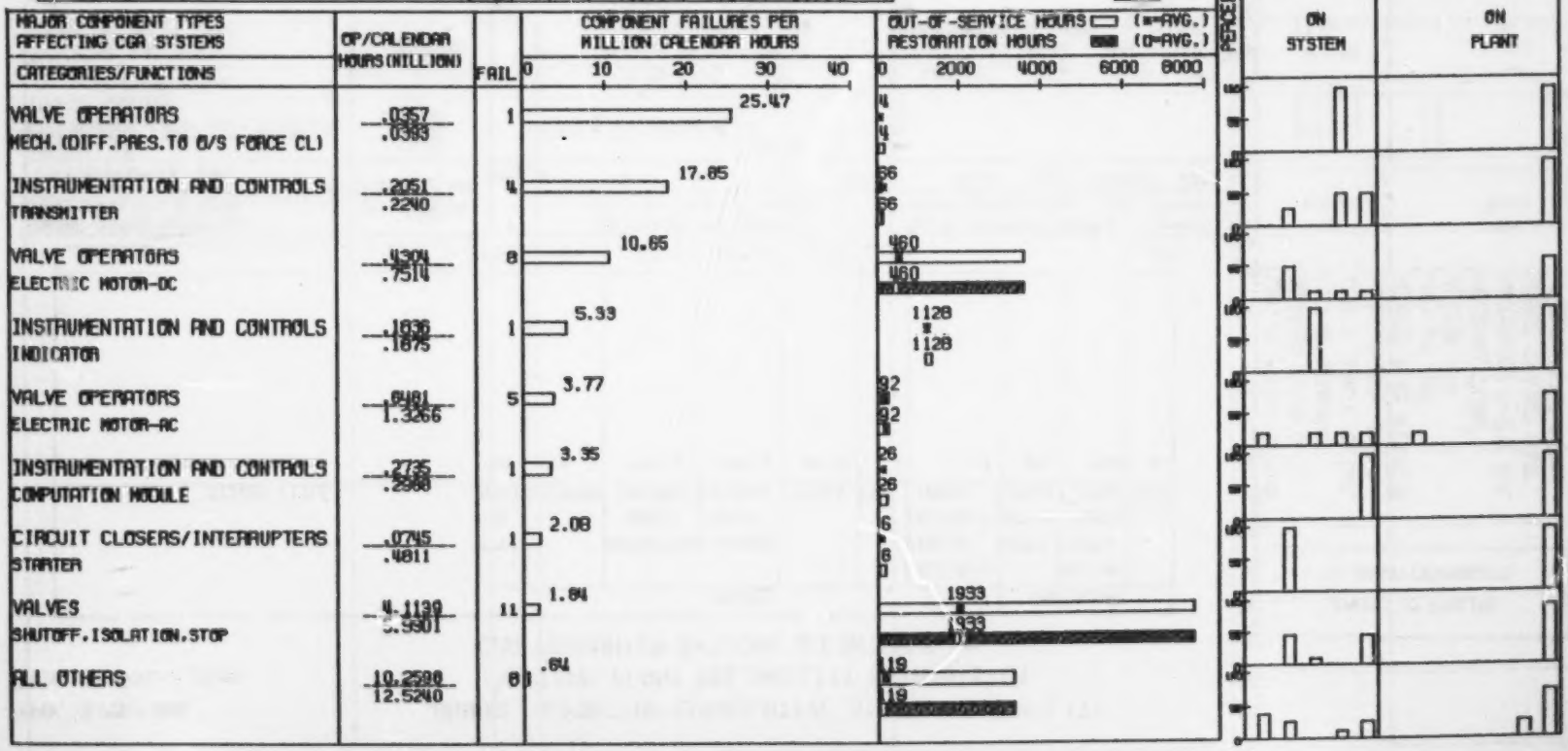
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CGA REACTOR COOLANT CLEANUP SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
REACTOR WATER CLEANUP SYS.	GE	18	851.6	892.9	23984	3	3.36	861	861	40
TOTAL		18	851.6	892.9	23984	3				40



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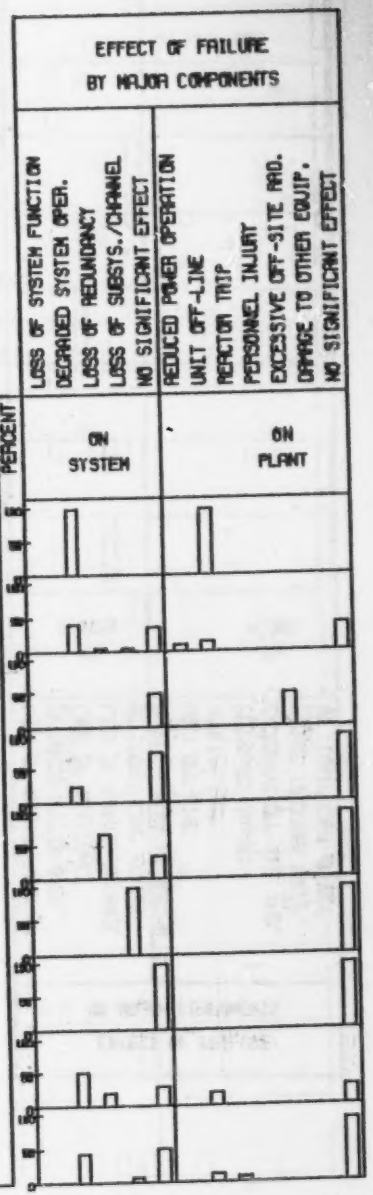
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CHA FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONDENSATE AND FEEDWATER	GE	19	776.4	950.5	21771	1	1.05	383	383	60
TOTAL		19	776.4	950.5	21771	1				60

MAJOR COMPONENT TYPES AFFECTING CHA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (D=AVG.)
MECHANICAL FUNCTION UNITS TURBINE CONTROL	.0216 .0384	1	26.03	41 41
VALVES ONE-WAY FLOW	1.7568 2.2588	22	9.74	452 451
INSTRUMENTATION AND CONTROLS RECORDER	.2386 .2650	2	7.55	17 17
HEAT EXCHANGERS OTHER	.4560 .5102	4	7.28	49 49
PUMPS 2500-9999 GPM	.3131 .5102	3	5.46	137 137
INSTRUMENTATION AND CONTROLS INDICATOR	.2971 .3179	1	3.15	2044 2044
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.2982 .3844	1	2.60	26 26
VALVES SHUTOFF,ISOLATION,STOP	4.1582 4.6925	10	2.04	431 431
ALL OTHERS	18.7636 21.3408	16	.75	25 25

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CIA REACTOR COOLANT PRESS. BOUND. LEAK. DET. SYS.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
LEAK DETECTION SYSTEM	GE	4	158.5	185.1	102	0	.00	2	3028	5
TOTAL		4	158.5	185.1	102	0				5

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING CIA SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1500 3000 4500 6000)
INSTRUMENTATION AND CONTROLS TRANSMITTER	.0824 / .0835	1	11.90	4
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.7952 / .8788	4	4.55	3781 / 2

PERCENT

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EAA OFFSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
POWER TRANSMISSION SYS.	GE	5	195.2	204.0	0	0	.00	3	3	1
TOTAL		5	195.2	204.0	0	0				1

MAJOR COMPONENT TYPES AFFECTING EAA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 5 10 15 20)
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	.0001 .0571	1	17.51	3 ▪ 3 ▭

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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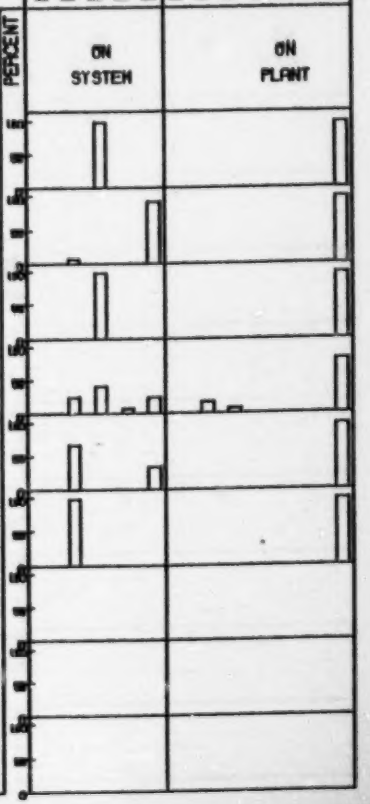
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBA AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
PLANT ELECTRICAL SYSTEMS	GE	18	884.8	892.9	24987	0	.00	114	114	32
TOTAL		18	884.8	892.9	24987	0				32

MAJOR COMPONENT TYPES AFFECTING EBA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS RESTORATION HOURS (▭=AVG.) (▮▮=D-AVG.)
TRANSFORMERS OTHER	.1096 .2197	1	4.55	430 430
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	2.6367 9.4697	14	4.03	4 4
GENERATORS GENERATOR	1.0340 1.0675	1	.94	94 94
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	12.0803 78.5553	12	.15	253 253
CIRCUIT CLOSERS/INTERRUPTERS CONTACTOR	22.1310 22.0646	9	.13	20 20
CIRCUIT CLOSERS/INTERRUPTERS STARTER	4091 20.7416	1	.05	45 45

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBB AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STANDBY POWER SYSTEM	GE	5	239.7	239.8	150	0	.00	0	0	0
	TOTAL	5	239.7	239.8	150	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ECA DC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
DC INSTRUMENT POWER	GE	8	381.6	381.6	4718	0	.00	172	172	1
TOTAL		8	381.6	381.6	4718	0				1

MAJOR COMPONENT TYPES AFFECTING ECA SYSTEMS	CP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.) 0 50 100 150 200
CATEGORIES/FUNCTIONS				
BATTERIES & CHARGERS	.3996	1	2.50	172
OTHER	.3997			172

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
	LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
	DEGRADED SYSTEM OPER.	UNIT OFF-LINE
	LOSS OF REDUNDANCY	REACTOR TRIP
	LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
	NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
		DAMAGE TO OTHER EQUIP.
		NO SIGNIFICANT EFFECT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ECB DC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
BATTERY SYSTEM	GE	14	671.0	683.4	16268	1	1.46	34	34	4
TOTAL		14	671.0	683.4	16268	1				4

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING ECB SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 50 100 150 200)	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSTS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
CATEGORIES/FUNCTIONS					ON SYSTEM					ON PLANT						
BATTERIES & CHARGERS	.4954	1	1.81	102 ■ 102 □												
OTHER	.5540															
BATTERIES & CHARGERS	4.5199	2	.42	5 ■ 5 □												
STATION BATTERY	4.7091															
CIRCUIT CLOSERS/INTERRUPTERS	4.2715	1	.23	25 ■ 25 □												
CONTACTOR	4.2822															

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EEA EMERGENCY GENERATOR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
DIESEL EMERG. POWER SYS.	GE	18	69.5	917.3	31840	3	3.27	160	160	124
TOTAL		18	69.5	917.3	31840	3				124

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING EEA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1000 2000 3000 4000)
TURBINES OVER 5000 HP	.0014 / .0549	2	36.43	66 / 66 / 0
ENGINES, INTERNAL COMBUSTION DIESEL OR NO.2 FUEL OIL	.0062 / 1.7389	49	28.18	109 / 109
RELAYS OTHER	.0001 / .0571	1	17.51	26 / 26 / 0
GENERATORS GENERATOR	.0072 / 1.7285	26	15.04	326 / 326
BLOWERS COMPRESSOR	.4155 / 1.5686	22	14.02	99 / 99
PUMPS 500-2499 GPM	.1328 / .1714	2	11.67	21 / 21 / 1
VALVES PRESSURE RELIEF	.1098 / .2427	1	4.12	336 / 336 / 0
MECHANICAL FUNCTION UNITS ENGINE CONTROL	.2271 / .6750	2	2.96	5 / 5
ALL OTHERS	53.9849 / 112.8211	19	.17	9 / 9

PERCENT

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FBR SPENT FUEL STORAGE FACILITIES

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL STORAGE EQUIPMENT	GE	6	11.0	303.3	12	0	.00	0	0	0
	TOTAL	6	11.0	303.3	12	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FCA SPENT FUEL POOL COOLING & CLEANUP SYS. &CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL POOL COOLING SYS.	GE	6	296.6	300.5	0	0	.00	20	20	2
TOTAL		6	296.6	300.5	0	0				2

MAJOR COMPONENT TYPES AFFECTING FCA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (▪=AVG.) (0 10 20 30 40)
MOTORS 100-499 HP	.0548 / .1098	1	9.11	8 ▪ 8 0
PUMPS 500-2499 GPM	.0759 / .1934	1	5.17	32 ▪ 32 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	ON SYSTEM: DEGRADED SYSTEM OPER.	ON SYSTEM: LOSS OF REDUNDANCY	ON SYSTEM: LOSS OF SUBSYS./CHANNEL	ON SYSTEM: NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	ON PLANT: UNIT OFF-LINE	ON PLANT: REACTOR TRIP	ON PLANT: PERSONNEL INJURY	ON PLANT: EXCESSIVE OFF-SITE RAD.	ON PLANT: DAMAGE TO OTHER EQUIP.	ON PLANT: NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FDB FUEL HANDLING SYSTEMS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REFUELING EQUIPMENT	GE	6	7.7	370.6	244	0	.00	0	0	0
	TOTAL	6	7.7	370.6	244	0				0

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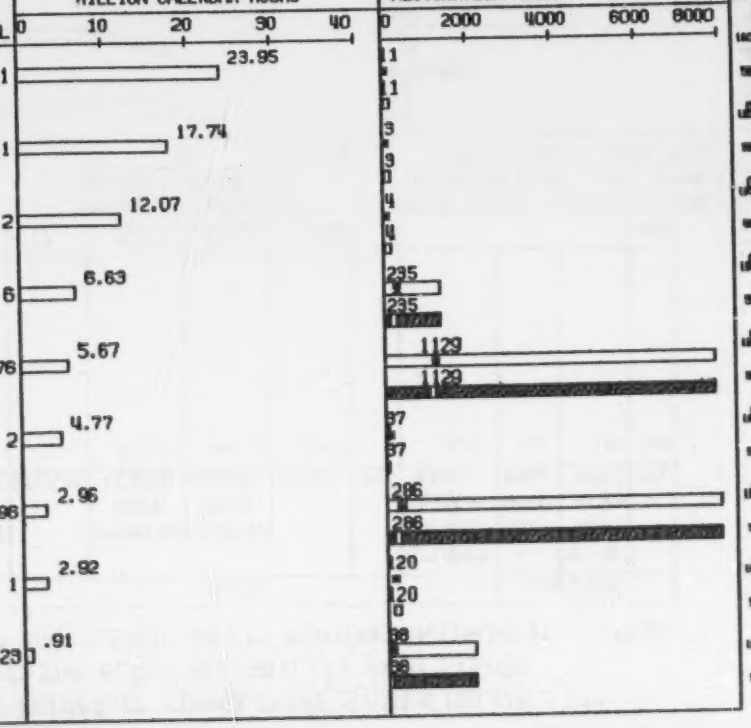
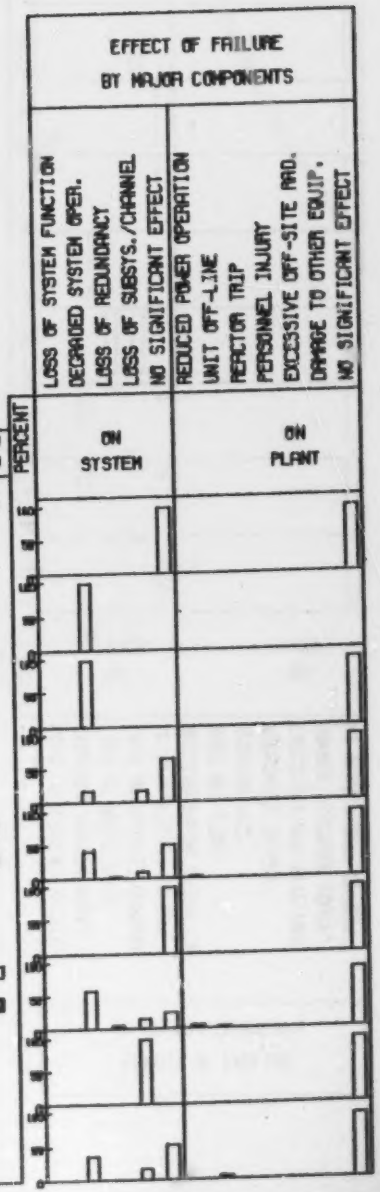
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IAA REACTOR TRIP SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
NEUTRON MONITORING SYSTEM	GE	17	770.4	834.0	27415	1	1.20	804	804	308
	TOTAL	17	770.4	834.0	27415	1				308

MAJOR COMPONENT TYPES AFFECTING IAA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.)
VALVES SHUTOFF,ISOLATION,STOP	.0416 / .0418	1	23.95	11 / 11
INSTRUMENTATION AND CONTROLS CONTROLLER	.0558 / .0564	1	17.74	3 / 3
INSTRUMENTATION AND CONTROLS INTEGRATOR (TOTALIZER)	.1653 / .1657	2	12.07	4 / 4
INSTRUMENTATION AND CONTROLS RECORDER	.6951 / .9054	6	6.63	235 / 235
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	24.9367 / 31.0223	176	5.67	1129 / 1129
CIRCUIT CLOSERS/INTERRUPTERS SWITCH(OTHER THAN SENSOR)	.4186 / .4197	2	4.77	37 / 37
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	28.3661 / 32.4679	96	2.96	286 / 286
INSTRUMENTATION AND CONTROLS SWITCH	.3419 / .3427	1	2.92	120 / 120
ALL OTHERS	21.3756 / 25.2585	23	.91	38 / 38





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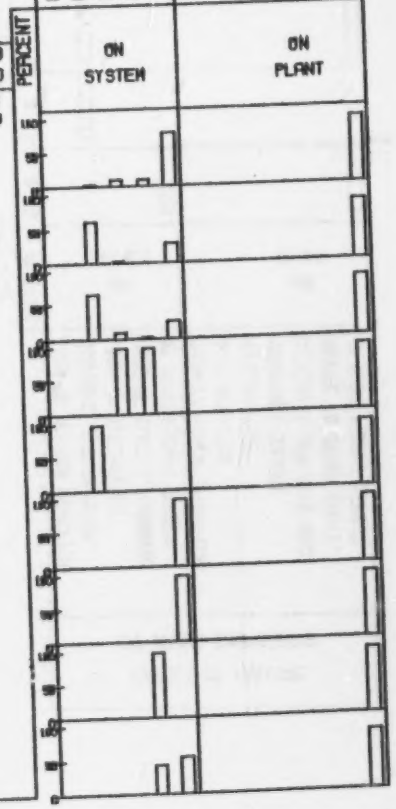
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBA ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
REACTOR PROTECTION SYSTEM	GE	17	702.2	841.0	14014	3	3.57	115	115	140
	TOTAL	17	702.2	841.0	14014	3				140

MAJOR COMPONENT TYPES AFFECTING IBA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.)
INSTRUMENTATION AND CONTROLS INDICATOR	2.9659 / 3.2717	31	9.46	102 / 102
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	6.2087 / 6.3466	38	5.99	197 / 197
INSTRUMENTATION AND CONTROLS SWITCH	16.2339 / 17.7338	56	3.16	45 / 45
RELAYS 200-300 VDC	.6222 / .6244	2	2.43	4 / 4
RELAYS 200-300 VAC	.2720 / .4217	1	2.37	8 / 8
GENERATORS GENERATOR	.4930 / .6058	1	1.65	10 / 10
CIRCUIT CLOSERS/INTERRUPTERS CONTACTOR	.6837 / .6854	1	1.46	8 / 8
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.6942 / .6969	1	1.43	29 / 29
ALL OTHERS	49.2308 / 55.5493	9	.16	35 / 35

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ICA SYSTEMS REQUIRED FOR SAFE SHUTDOWN

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REMOTE SHUTDOWN SYSTEM	GE	2	.7	75.3	32	0	.00	0	0	0
	TOTAL	2	.7	75.3	32	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEA OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONTROL ROOM PANELS	GE	10	491.0	491.0	24894	0	.00	216	216	1
TOTAL		10	491.0	491.0	24894	0				1

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING IEA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 100 200 300 400)
INSTRUMENTATION AND CONTROLS	6.6504 / 7.5394	1	.13	216 ■ 216 □
INDICATOR				

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEB OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
LOCAL PANELS AND RACKS	GE	6	290.8	292.0	0	0	.00	0	0	0
	TOTAL	6	290.8	292.0	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MAA LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RAD. WASTE DISPOSAL SYS.	GE	7	345.4	360.5	10086	0	.00	176	176	8
TOTAL		7	345.4	360.5	10086	0				8

MAJOR COMPONENT TYPES AFFECTING MAA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 200 400 600 800)
VALVE OPERATORS SOLENOID-DC	.0017 / .0049	2	29.55	412 / 412
VALVE OPERATORS HYDRAULIC	.3418 / .3426	2	5.84	9 / 9
VALVES SHUTOFF.ISOLATION.STOP	.0554 / 1.0589	4	3.78	141 / 141

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT: 100 90 80 70 60 50 40 30 20 10 0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MBA GASEOUS RADIOACTIVE WASTE MANAGEMENT SYSTEMS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
OFF-GAS SYSTEM	GE	2	86.6	110.0	0	0	.00	0	0	0
TOTAL		2	86.6	110.0	0	0				0

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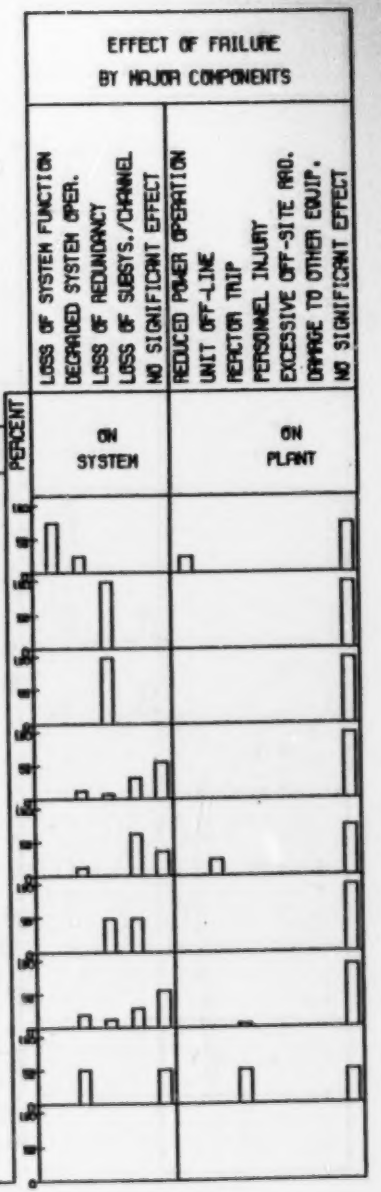
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MCA PROCESS & EFFLUENT RAD. MONITORING SYS.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PROCESS RAD. MONIT. SYS.	GE	14	696.4	716.7	16100	3	4.19	61	61	59
TOTAL		14	696.4	716.7	16100	3				59

MAJOR COMPONENT TYPES AFFECTING MCA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▬=AVG.) (0 500 1000 1500 2000)
PUMPS	.1035	4	23.34	0
OTHER	.1714			0
INSTRUMENTATION AND CONTROLS	.0570	1	17.51	2
TRANSMITTER	.0571			2
BLOWERS	.0570	1	8.76	1
VACUUM	.1142			1
INSTRUMENTATION AND CONTROLS	3.7257	25	5.69	47
INDICATOR	4.3973			47
INSTRUMENTATION AND CONTROLS	1.8221	8	2.87	53
COMPUTATION MODULE	2.7890			53
INSTRUMENTATION AND CONTROLS	.4272	2	2.64	2
POWER SUPPLY	.7579			2
INSTRUMENTATION AND CONTROLS	6.5090	16	2.12	122
SENSOR/DETECTOR/ELEMENT	7.5468			122
INSTRUMENTATION AND CONTROLS	1.5801	2	1.03	14
RECORDER	1.9358			14

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PAA COMPRESSED AIR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
INSTRUMENT/SERV. AIR SYS.	GE	9	490.3	498.2	6590	0	.00	466	466	7
TOTAL		9	490.3	498.2	6590	0				7

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING PAA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 250 500 750 1000)	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
					ON SYSTEM					ON PLANT						
VALVES ONE-WAY FLOW	.7195 / .7750	6	7.73	460 / 460												
VALVES 3-WAY SELECTOR	.6777 / .6794	1	1.47	504 / 504 / 0												

PERCENT 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PBA PROCESS SAMPLING SYSTEMS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SAMPLING SYSTEM	GE	1	57.5	57.5	78	0	.00	0	0	0
	TOTAL	1	57.5	57.5	78	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCA CHEMICAL. VOLUME CONTROL. & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STANDBY LIQUID CNTRL. SYS.	GE	18	140.3	869.5	35513	0	.00	435	435	42
TOTAL		18	140.3	869.5	35513	0				42

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING PCA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.) 0 1500 3000 4500 6000
VALVES PRESSURE RELIEF	.8561 / 1.5130	23	15.20	276 / 276
INSTRUMENTATION AND CONTROLS TRANSMITTER	.5485 / 1.0102	5	4.95	17 / 17
PUMPS UNDER 500 GPM	.0037 / 1.4513	5	3.45	1673 / 1673
NON-PEDIGREE COMPONENTS SEE APPENDIX A , A02(15)	.1139 / .8509	1	1.16	56 / 56
VALVES ONE-WAY FLOW	2.1169 / 3.9572	3	.76	1087 / 1087
INSTRUMENTATION AND CONTROLS INDICATOR	1.1445 / 1.9281	1	.52	16 / 16
VALVES FLOW CONTRL	2.4186 / 4.0303	2	.50	11 / 11
VALVES SHUTOFF.ISOLATION.STOP	4.6828 / 11.6453	2	.17	61 / 61

PERCENT
ON SYSTEM
ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RAA REACTOR VESSEL INTERNALS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (PVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
REACTOR ASSEMBLY	GE	13	658.3	667.1	22698	1	1.50	496	522	90
TOTAL		13	658.3	667.1	22698	1				90

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

PERCENT — ON SYSTEM — ON PLANT

MAJOR COMPONENT TYPES AFFECTING RAA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (▨=AVG.) (0 1500 3000 4500 6000)
NON-PEDIGREE COMPONENTS SEE APPENDIX A . R02(15)	.5365 / .6569	2	3.04	386 / 386
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.0873 / 2.3068	4	1.73	98 / 98 / 18
CONTROL ROD DRIVE MECHANISMS HYDRAULIC PISTON	70.5140 / 70.7284	73	1.03	464 / 464
CONTROL RODS REGULATING	6.7710 / 7.3654	2	.27	57 / 57 / 0
CONTROL RODS SHUTDOWN	70.5640 / 70.7484	9	.13	1315 / 898

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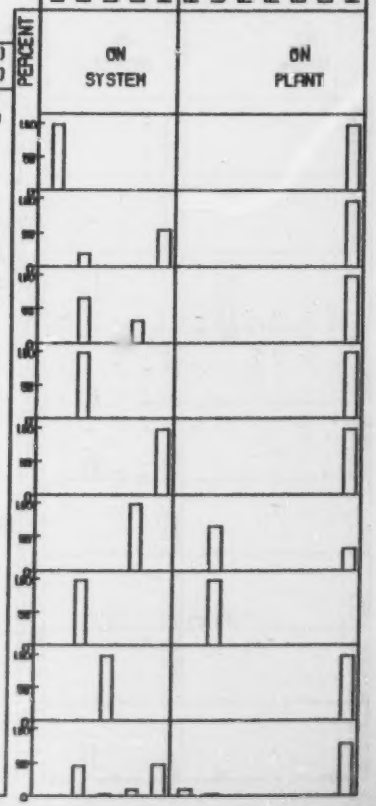
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RBA REACTIVITY CONTROL SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CONTROL ROD DRIVE HYD.SYS.	GE	19	836.3	924.9	48691	2	2.16	189	189	307
	TOTAL	19	836.3	924.9	48691	2				307

MAJOR COMPONENT TYPES AFFECTING RBA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) / RESTORATION HOURS (□=AVG.) (0 2000 4000 6000 8000)
CIRCUIT CLOSERS/INTERRUPTERS CONTROLLER	.0000 / .0564	1	17.73	43 / 43
CONTROL ROD DRIVE MECHANISMS OTHER	29.8523 / 31.7505	209	6.58	167 / 167
CIRCUIT CLOSERS/INTERRUPTERS SWITCH(OTHER THAN SENSOR)	.1136 / .5027	3	5.97	34 / 34
VALVES VACUUM RELIEF	.0503 / .1713	1	5.84	3220 / 3220
INSTRUMENTATION AND CONTROLS CONTROLLER	.3712 / .4205	1	2.38	27 / 27
FILTERS/STRAINERS LIQUID	1.4699 / 1.8687	3	1.61	3 / 3
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.6591 / .8224	1	1.22	1 / 1
MOTORS 100-499 HP	.6719 / .8880	1	1.13	1735 / 1735
ALL OTHERS	344.8801 / 396.6184	67	.22	2 / 2

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RCA REACTOR CORE

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL & RELOADS	GE	14	635.8	745.3	6847	0	.00	0	0	0
TOTAL		14	635.8	745.3	6847	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SAA REACTOR CONTAINMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONT. & PRESS. SUPP. SYS.	GE	18	811.5	893.4	10973	2	2.24	371	371	157
TOTAL		18	811.5	893.4	10973	2				157

MAJOR COMPONENT TYPES AFFECTING SAA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS ▭ (=-AVG.) RESTORATION HOURS ▬ (D-AVG.) 0 1500 3000 4500 6000
VALVES 3-WAY SELECTOR	.2278 .2284	4	17.51	8 8
VALVES ONE-WAY FLOW	.2258 .3251	3	9.23	774 774
PRESSURE VESSELS PRESSURE SUPPRESSION	.1041 .1208	1	8.28	699 699
PENETRATIONS, PRIMARY CONT. FUEL HANDLING	.1103 .1230	1	8.13	406 406
INSTRUMENTATION AND CONTROLS SWITCH	2.6510 2.7403	16	5.84	218 173
VALVES SHUTOFF,ISOLATION,STOP	6.2307 6.2587	45	5.45	684 684
VALVES VACUUM RELIEF	4.1656 5.1196	24	4.69	501 501
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	3.1898 5.2262	15	4.65	90 90
ALL OTHERS	137.0439 164.4815	48	.29	3 3

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT

ON SYSTEM
- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT

ON PLANT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

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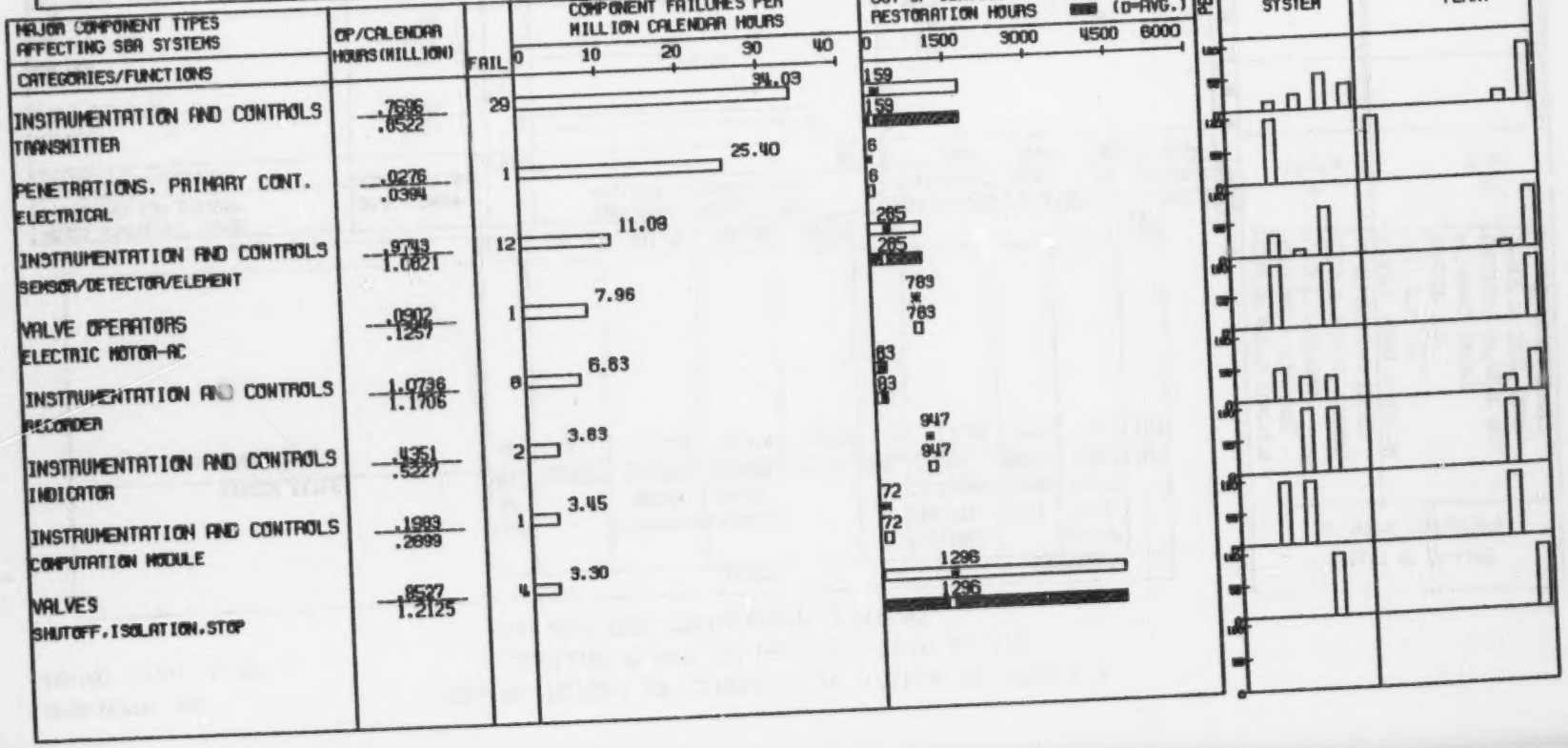
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SBA CONTAINMENT HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONT. ATMOSP. COOL. SYS.	GE	5	231.2	263.2	7026	0	.00	267	267	58
TOTAL		5	231.2	263.2	7026	0				58



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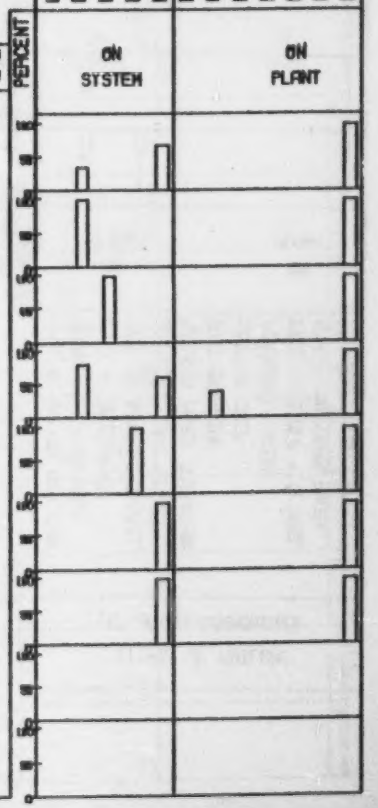
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCA CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CONT. ATMOSP. CONTROL SYS.	GE	11	350.8	575.9	8480	2	3.47	359	359	17
	TOTAL	11	350.8	575.9	8480	2				17

MAJOR COMPONENT TYPES AFFECTING SCA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 500 1000 1500 2000)
VALVE OPERATORS MECH.(DIFF.PRES.TO O/S FORCE CL)	.2313 / .3997	6	15.01	217 / 217
VALVES VENT	.2848 / .2855	1	3.50	1656 / 1656
INSTRUMENTATION AND CONTROLS CONTROLLER	.0961 / .9305	1	1.07	31 / 31
VALVES SHUTOFF,ISOLATION,STOP	2.3425 / 5.8589	5	.85	610 / 610
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.3231 / 1.4636	1	.68	1 / 1
INSTRUMENTATION AND CONTROLS INDICATOR	.3242 / 1.5734	1	.64	53 / 53
INSTRUMENTATION AND CONTROLS SWITCH	4.0268 / 4.5688	2	.44	1 / 1

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SDC CONTAINMENT ISOLATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONTNMT ISOL SYS & CONTRL	GE	3	49.4	149.6	109	0	.00	255	255	26
TOTAL		3	49.4	149.6	109	0				26

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING SDC SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1000 2000 3000 4000)
INSTRUMENTATION AND CONTROLS SWITCH	2.5060 / 2.5122	9	3.58	30 / 30
VALVES SHUTOFF,ISOLATION,STOP	.3583 / 1.5150	5	3.30	789 / 789
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.3204 / .3427	1	2.92	0 / 0
INSTRUMENTATION AND CONTROLS CONTROLLER	2.1295 / 2.3066	2	.87	612 / 612
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.2113 / 3.0923	2	.65	27 / 27
RELAYS 100-199 VAC	6.5752 / 10.5185	5	.48	26 / 26
CIRCUIT CLOSERS/INTERRUPTERS SWITCH(OTHER THAN SENSOR)	3.3420 / 4.5458	2	.44	467 / 467

EFFECT OF FAILURE BY MAJOR COMPONENTS	PERCENT ON SYSTEM	PERCENT ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SEA CONTAIN. COMBUSTIBLE GAS CONT. SYS. & CONT.

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STANDBY GAS TREATMENT SYS.	GE	17	292.5	851.3	28757	1	1.17	70	70	29
TOTAL		17	292.5	851.3	28757	1				29

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING SEA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (0=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
BLOWERS FAN	.1050 1.0831	6	5.49	146 146		
INSTRUMENTATION AND CONTROLS RECORDER	.0482 .2680	1	3.73	49 49		
VALVES 3-WAY SELECTOR	.3418 .3426	1	2.82	34 34		
RELAYS 100-199 VAC	.0002 2.1058	3	1.42	54 54		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.3156 2.5824	3	1.16	20 20		
INSTRUMENTATION AND CONTROLS SWITCH	.4567 .8644	1	1.16	5 5		
HEATERS, ELECTRIC OTHER	.3810 .9817	1	1.02	37 37		
FILTERS/STRAINERS GAS	1.5152 3.0758	3	.98	91 91		
ALL OTHERS	11.3030 25.6217	10	.39	6 6		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFA EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
LOW PRESS. COOL. INJ. SYS.	GE	12	49.2	616.6	8059	1	1.62	129	129	67
TOTAL		12	49.2	616.6	8059	1				67

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING SFA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 50 100 150 200)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 1500 3000 4500 6000)	PERCENT ON SYSTEM	PERCENT ON PLANT
GENERATORS	.0925 / .1142	18	157.63	88 / 88		
INVERTER						
VALVE OPERATORS	.0416 / .0417	1	23.96	45 / 45		
SOLENOID-DC						
CIRCUIT CLOSERS/INTERRUPTERS	.0449 / .0571	1	17.51	2 / 2		
CIRCUIT BREAKER						
HEAT EXCHANGERS	.0051 / .0788	7	14.62	137 / 137		
COOLER						
VALVE OPERATORS	1.7077 / 5.1119	20	3.91	10 / 10		
ELECTRIC MOTOR-AC						
PUMPS	.0030 / 1.7310	2	1.16	2 / 2		
2500-9999 GPM						
INSTRUMENTATION AND CONTROLS	.1181 / 1.9266	2	1.04	180 / 180		
SWITCH						
VALVES	1.3395 / 4.1328	4	.97	135 / 135		
ONE-WAY FLOW						
ALL OTHERS	30.9058 / 57.1711	12	.21	40 / 40		

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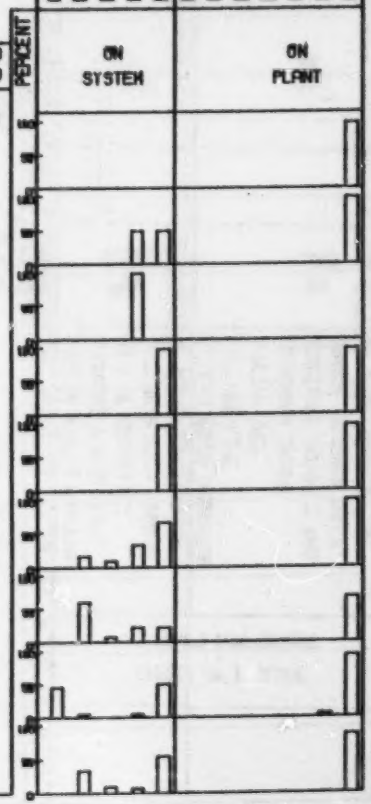
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFB EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CORE SPRAY SYSTEM	GE	18	45.9	892.7	13654	1	1.12	453	453	101
	TOTAL	18	45.9	892.7	13654	1				101

MAJOR COMPONENT TYPES AFFECTING SFB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (■=AVG.) / RESTORATION HOURS (□=AVG.) (0 2000 4000 6000 8000)
RELAYS / OTHER	.0482 / .0571	1	17.51	4 / 4 / 0
INSTRUMENTATION AND CONTROLS / CONTROLLER	.0193 / .1732	2	11.55	23 / 23
VALVE OPERATORS / ELECTRIC MOTOR-DC	.0000 / .1671	1	5.89	1 / 1 / 0
CIRCUIT CLOSERS/INTERRUPTERS / CIRCUIT BREAKER	.0002 / .1713	1	5.84	1 / 1 / 0
VALVES / VENT	.4294 / .4305	1	2.32	158 / 158 / 0
INSTRUMENTATION AND CONTROLS / SWITCH	3.4893 / 5.1759	12	2.32	666 / 666
VALVE OPERATORS / ELECTRIC MOTOR-AC	1.1455 / 7.0548	13	1.84	241 / 241
NON-PEDIGREE COMPONENTS / SEE APPENDIX A . A02(15)	10.9566 / 13.0769	20	1.53	425 / 425
ALL OTHERS	37.2092 / 77.2314	50	.65	10 / 10

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFC EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
HIGH PRESS. COOL. INJ.SYS.	GE	14	.6	695.6	20594	13	18.69	238	238	206
TOTAL		14	.6	695.6	20594	13				206

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING SFC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.)	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
HEAT EXCHANGERS	.0001	11	32.64	335												
CONDENSER	.3370			335												
TURBINES	.0010	7	9.49	78												
1000-5000 HP	.7375			78												
INSTRUMENTATION AND CONTROLS	.0098	1	9.40	649												
RECORDER	.1063			649												
MOTORS	.0011	1	9.29	123												
25-99.9 HP	.1076			123												
GENERATORS	.1842	2	7.09	12												
INVERTER	.2821			12												
MECHANICAL FUNCTION UNITS	.0000	2	6.49	142												
TURBINE CONTROL	.3084			142												
INSTRUMENTATION AND CONTROLS	11.7726	64	4.87	11												
SENSOR/DETECTOR/ELEMENT	13.1492			33												
INSTRUMENTATION AND CONTROLS	.4215	3	4.46	13												
COMPUTATION MODULE	.6727			13												
ALL OTHERS	45.5804	115	1.25	9												
	91.0961			9												

PERCENT — ON SYSTEM — ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WAA STATION SERVICE WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
SERVICE WATER SYSTEM	GE	10	392.2	525.2	21381	0	.00	173	173	15
TOTAL		10	392.2	525.2	21381	0				15

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING WAA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 200 400 600 800)	PERCENT ON SYSTEM	PERCENT ON PLANT
CIRCUIT CLOSERS/INTERRUPTERS SWITCH(OTHER THAN SENSOR)	2797 1.1260	4	3.55	173 173		
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.0339 1.2418	3	2.42	244 244		
RELAYS 200-300 VDC	.5801 .9320	1	1.07	6 6		
VALVES FLOW CONTROL	20.7979 22.3208	6	.27	74 74		
VALVES SHUTOFF,ISOLATION,STOP	.9418 0.2980	1	.11	724 724		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WBA COOLING SYSTEMS FOR REACTOR AUXILIARIES & CON

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REAC.BLDG.CLOSED WTR. SYS.	GE	13	615.3	621.5	21331	0	.00	22	22	4
TOTAL		13	615.3	621.5	21331	0				4

EFFECT OF FAILURE BY MAJOR COMPONENTS

	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM												
ON PLANT												

MAJOR COMPONENT TYPES AFFECTING WBA SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.) (0 15 30 45 60)
CATEGORIES/FUNCTIONS				
HEAT EXCHANGERS	.1085	9	18.21	13
COOLER	.1647			13
ANNUNCIATOR MODULES	.2476	1	2.53	48
AUDIO/VISUAL	.3947			48

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WCA DEMINERALIZED WATER MAKE-UP SYSTEMS & CONT.

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
MAKE-UP WATER SYSTEM	GE	2	88.5	114.5	0	0	.00	0	0	0
	TOTAL	2	88.5	114.5	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WFA CONDENSATE STORAGE FACILITIES

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONDENSATE TRAN. &STRG. SYS.	GE	3	143.8	170.3	7020	0	.00	690	690	1
TOTAL		3	143.8	170.3	7020	0				1

MAJOR COMPONENT TYPES AFFECTING WFA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (▩ =AVG.) (0 200 400 600 800)
VALVE OPERATORS	.0000	1	5.91	690
ELECTRIC MOTOR-AC	.1692			= 690
				0

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
100		
95		
90		
85		
80		
75		
70		
65		
60		
55		
50		
45		
40		
35		
30		
25		
20		
15		
10		
5		
0		

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

ANNUAL REPORT OF CUMULATIVE SYSTEM RELIABILITY (A02) FOR BABCOCK & WILCOX UNITS

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
BAB AREA MONITORING SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
RADIATION MONITORING SYSTEM	B&W	2	63.7	80.2	37	0	.00	281	281	133
TOTAL		2	63.7	80.2	37	0				133

MAJOR COMPONENT TYPES AFFECTING BAB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 15 30 45 60	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▬=AVG.) 0 1000 2000 3000 4000
INSTRUMENTATION AND CONTROLS	~~2.3516~~	133	55.95	281
SENSOR/DETECTOR/ELEMENT	2.3771			281

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION DEGRADED SYSTEM OPER. LOSS OF REDUNDANCY LOSS OF SUBSYS./CHANNEL NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION UNIT OFF-LINE REACTOR TRIP PERSONNEL INJURY EXCESSIVE OFF-SITE RAD. DAMAGE TO OTHER EQUIP. NO SIGNIFICANT EFFECT
ON SYSTEM	ON PLANT

PERCENT 0 5 10 15 20 25 30 35 40 45 50 55 60

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CAE REACTOR VESSELS & APPURTENANCES

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR VESSEL	B&W	6	287.2	303.9	7233	1	3.29	105	105	1
TOTAL		6	287.2	303.9	7233	1				1

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

MAJOR COMPONENT TYPES AFFECTING CAE SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS ▭ (=AVG.) ▬ (D=AVG.) RESTORATION HOURS 0 50 100 150 200	PERCENT
PRESSURE VESSELS	~~.3021~~	1	3.10	105	
REACTOR VESSEL	.3221			= 105 D	

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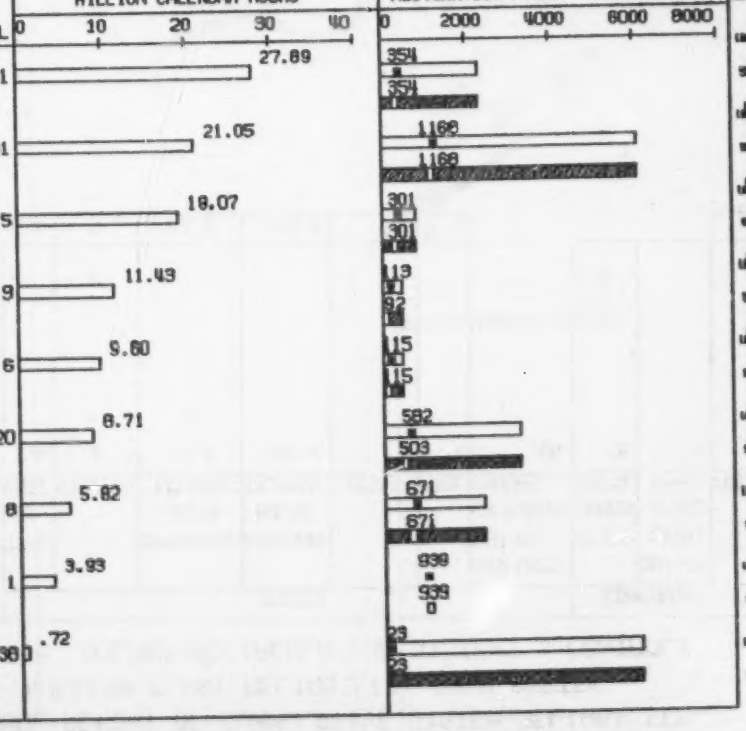
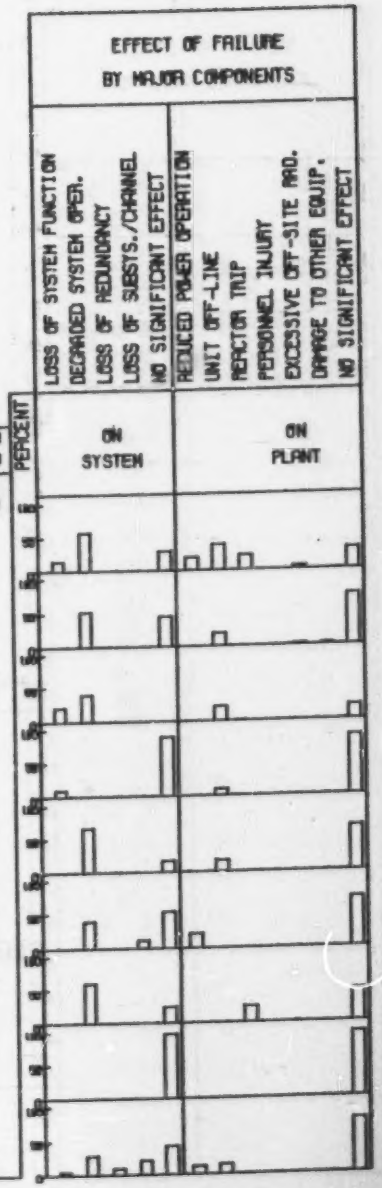
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBD COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
REACTOR COOLANT	B&W	10	361.8	492.8	13745	4	8.12	678	678	149
TOTAL		10	361.8	492.8	13745	4				149

MAJOR COMPONENT TYPES AFFECTING CBD SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.)
PUMPS OVER 50.000 GPM	.7212 / 1.1115	31	27.89	354 / 354
VALVES PRESSURE RELIEF	.7001 / 1.4728	31	21.05	1168 / 1168
PUMPS 500-2499 GPM	.1850 / .2621	5	18.07	301 / 301
HEAT EXCHANGERS STEAM GENERATOR	.5320 / .7871	9	11.43	113 / 92
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.3010 / .6247	6	9.60	115 / 115
VALVE OPERATORS ELECTRIC MOTOR-AC	.5000 / 2.2950	20	8.71	582 / 503
MOTORS 3000 HP AND OVER	.0080 / 1.3739	8	5.82	671 / 671
VALVES BYPASS	.1940 / .2545	1	3.93	939 / 939
ALL OTHERS	34.3478 / 52.9818	38	.72	23 / 23





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBE COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PRESSURIZER	B&W	3	99.3	130.6	6	0	.00	0	0	0
TOTAL		3	99.3	130.6	6	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBF COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PRESSURIZER RELIEF SYSTEM	B&W	4	94.3	185.7	24	0	.00	883	901	34
TOTAL		4	94.3	185.7	24	0				34

MAJOR COMPONENT TYPES AFFECTING CBF SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (A=AVG.) / RESTORATION HOURS (D=AVG.) (0 500 1000 1500 2000)
VALVES SHUTOFF,ISOLATION,STOP	.0694 / .1641	7	42.67	482 / 407
MOTORS LESS THAN 1 HP	.0000 / .0273	1	36.57	96 / 96 / 0
VALVE OPERATORS ELECTRIC MOTOR-AC	.0297 / .0774	2	25.83	108 / 108
NON-PEDIGREE COMPONENTS SEE APPENDIX A , A02(15)	5.7805 / 8.0085	24	3.99	1119 / 1119

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	34	
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY	34	
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT	34	
REDUCED POWER OPERATION		
UNIT OFF-LINE		34
REACTOR TRIP		34
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		34

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CFC RESIDUAL HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
DECAY HEAT REMOVAL SYSTEM	B&W	5	56.2	219.1	49	0	.00	467	467	46
TOTAL		5	56.2	219.1	49	0				46

MAJOR COMPONENT TYPES AFFECTING CFC SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 1500 3000 4500 6000)
VALVE OPERATORS OTHER	.0000 .1060	5	47.16	233 233
VALVE OPERATORS ELECTRIC MOTOR-DC	.0000 .0530	2	37.73	80 80
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.0534 .1976	4	20.24	72 72
ACCUMULATORS HOLD UP STORAGE TANK	.0000 .0732	1	13.65	1160 1160
PUMPS 500-2499 GPM	.0779 .1002	1	9.98	178 178
INSTRUMENTATION AND CONTROLS OTHER	.0537 .1434	1	6.97	4 4
MOTORS 100-499 HP	.1387 .5854	3	5.12	605 605
PUMPS 2500-9999 GPM	.0781 .3193	1	3.13	661 661
ALL OTHERS	21.4872 37.6980	20	.74	21 21

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBE AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AC POWER DISTRIBUTION SYSTEM	B&W	9	433.4	459.4	7406	0	.00	149	156	24
TOTAL		9	433.4	459.4	7406	0				24

MAJOR COMPONENT TYPES AFFECTING EBE SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 • 500 1000 1500 2000)
GENERATORS	.2536 / .2650	15	56.60	171 • 171
INVERTER				
CIRCUIT CLOSERS/INTERRUPTERS	11.9101 / 48.6333	7	.14	81 • 57
CIRCUIT BREAKER				
RELAYS	8.7187 / 10.6059	1	.09	72 • 72
100-199 VDC				
CIRCUIT CLOSERS/INTERRUPTERS	.0015 / 18.4178	1	.06	552 • 552
STARTER				

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBG AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
AC INST. POWER	B&W	5	249.9	251.3	7388	0	.00	23	23	6
TOTAL		5	249.9	251.3	7388	0				6

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING EBG SYSTEMS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 20 40 60 80)
CATEGORIES/FUNCTIONS				
GENERATORS	~~1.1897~~ 1.2085	6	4.97	23
INVERTER				23

PERCENT

LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT
ON SYSTEM	ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ECD DC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
DC POWER SYSTEMS AND CONTROLS	B&W	5	243.9	260.1	7272	0	.00	799	799	6
TOTAL		5	243.9	260.1	7272	0				6

MAJOR COMPONENT TYPES AFFECTING ECD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG. ■=AVG.) (0 1500 3000 4500 6000)
GENERATORS	.1665	1	5.99	4368
INVERTER	.1668			4368
BATTERIES & CHARGERS	.9907	5	3.16	85
STATION BATTERY	1.5812			85

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EDA ONSITE POWER SYS. & CONT. (COMPOSITE AC&DC)

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EMERGENCY POWER SYSTEMS	B&W	8	49.8	412.6	298	0	.00	360	360	4
TOTAL		8	49.6	412.6	298	0				4

MAJOR COMPONENT TYPES AFFECTING EDA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 500 1000 1500 2000)
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.0511 .0556	1	17.98	96 96 0
GENERATORS GENERATOR	.0262 .3983	2	5.02	663 663
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	.0001 .6069	1	1.24	16 16 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM												
ON PLANT												

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EEC EMERGENCY GENERATOR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EMERG. DIESEL GEN. SYS.	B&W	3	.8	136.1	187	2	14.70	93	93	21
TOTAL		3	.8	136.1	187	2				21

MAJOR COMPONENT TYPES AFFECTING EEC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▪=AVG.) (0 100 200 300 400)
GENERATORS	.0020 / .2720	11	40.44	51
GENERATOR				51
ENGINES, INTERNAL COMBUSTION	.0017 / .3072	10	32.55	139
DIESEL OR NO.2 FUEL OIL				139

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT (0 10 20 30 40 50)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FCB SPENT FUEL POOL COOLING & CLEANUP SYS. &CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SPENT FUEL COOLING SYSTEM	B&W	2	75.8	77.4	167	0	.00	1411	1411	1
TOTAL		2	75.6	77.4	167	0				1

MAJOR COMPONENT TYPES AFFECTING FCB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 500 1000 1500 2000)
NON-PEDIGREE COMPONENTS SEE APPENDIX A . R02(15)	.2500 .2580	1	3.88	1411 (■=AVG.) 1411 (□=AVG.)

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FOC FUEL HANDLING SYSTEMS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL HANDLING SYSTEM	B&W	1	13.1	33.4	0	0	.00	0	0	0
TOTAL		1	13.1	33.4	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HBA MAIN STEAM SUPPLY SYSTEM & CONTROLS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STEAM SUPPLY SYSTEM	B&W	7	254.4	335.6	24	1	2.98	437	437	65
TOTAL		7	254.4	335.6	24	1				65

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

ON SYSTEM
ON PLANT
PERCENT

MAJOR COMPONENT TYPES AFFECTING HBA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▬=AVG.) 0 1500 3000 4500 6000
VALVES PRESSURE RELIEF	.9178 3.3485	33	9.85	134 134
INSTRUMENTATION AND CONTROLS RECORDER	.3202 .3318	2	6.03	2089 2089
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.2182 .2187	1	4.57	80 80 0
VALVES PRESSURE CONTROL	.0408 .5678	2	3.52	466 466
VALVE OPERATORS ELECTRIC MOTOR-AC	.5427 1.3567	3	2.21	119 0 119
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.1818 1.0614	2	1.88	7 7
MOTORS 1-4.99 HP	.0333 .5937	1	1.68	192 192 0
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.5827 .6361	1	1.57	296 296 0
ALL OTHERS	14.3193 17.4277	20	1.15	45 45

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HEA TURBINE BYPASS SYSTEMS & CONTROLS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
TURBINE BYPASS SYSTEM	B&W	2	.3	83.6	21	0	.00	0	0	0
	TOTAL	2	.3	83.6	21	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HHA CONDENSATE AND FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FEEDWATER SYSTEM	B&W	8	308.2	388.4	4531	0	.00	664	664	51
TOTAL		8	308.2	388.4	4531	0				51

MAJOR COMPONENT TYPES AFFECTING HHA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG. ■=AVG.) (0 1000 2000 3000 4000)
MOTORS 25-99.9 HP	.0003 / .0547	3	54.86	72 / 72
INSTRUMENTATION AND CONTROLS TRANSMITTER	.1148 / .1669	2	11.98	360 / 360
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.0001 / 1.0443	6	5.75	138 / 139
NON-PEDIGREE COMPONENTS SEE APPENDIX A , A02(15)	2.7415 / 2.8342	16	5.65	1188 / 1188
VALVE OPERATORS ELECTRIC MOTOR-AC	.1207 / 4.4698	11	2.46	343 / 343
VALVES SHUTOFF.ISOLATION.STOP	3.2164 / 6.9666	10	1.44	794 / 794
VALVE ONE-WAY FLOW	.9111 / 2.2476	3	1.33	451 / 451

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HHB CONDENSATE AND FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EMERGENCY FEEDWATER SYSTEM	B&W	6	.7	272.1	92	1	3.68	207	207	25
TOTAL		6	.7	272.1	92	1				25

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING HHB SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 1000 2000 3000 4000)	PERCENT ON SYSTEM	PERCENT ON PLANT
PUMPS 500-2499 GPM	.0785 / .2609	7	26.83	41 / 41		
TURBINES 500-999 HP	.0009 / .2818	6	21.29	17 / 17		
VALVE OPERATORS ELECTRIC MOTOR-DC	.1665 / .1669	1	5.99	45 / 45		
PUMPS 2500-9999 GPM	.0008 / .1741	1	5.74	12 / 12		
VALVES FLOW CONTROL	.0006 / .2120	1	4.72	27 / 27		
CIRCUIT CLOSERS/INTERRUPTERS STARTER	.4607 / .6893	1	1.45	9 / 9		
VALVE OPERATORS ELECTRIC MOTOR-AC	.1467 / .7037	1	1.42	6 / 6		
VALVES ONE-WAY FLOW	1.0302 / 2.7486	2	.73	1037 / 1037		
ALL OTHERS	5.5716 / 9.9492	5	.50	104 / 104		

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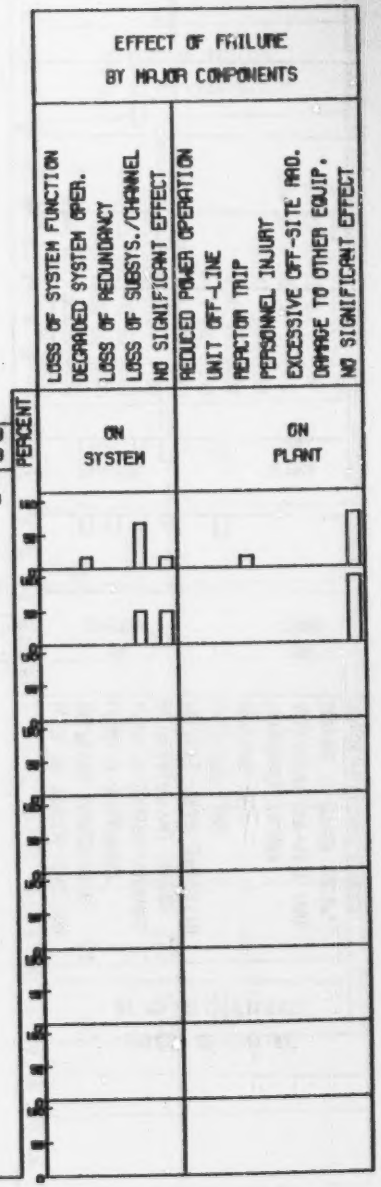
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IAB REACTOR TRIP SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
NUCLEAR INSTRUMENTATION	B&W	7	351.3	359.5	12253	0	.00	49	49	8
TOTAL		7	351.3	359.5	12253	0				8

MAJOR COMPONENT TYPES AFFECTING IAB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) / RESTORATION HOURS (D=AVG.) (0 100 200 300 400)
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	1.5983 / 2.0521	6	2.92	57 / 57
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	6.7578 / 8.8736	2	.23	25 / 25



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBB ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

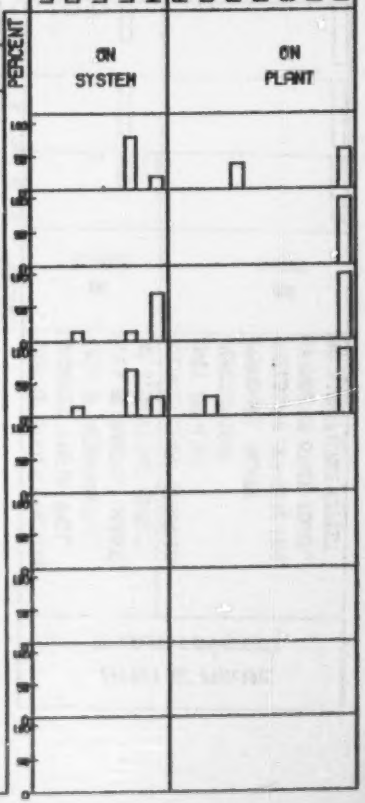
SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR PROTECTION SYSTEM	B&W	7	271.9	340.0	16865	0	.00	20	24	20
TOTAL		7	271.9	340.0	16865	0				20

MAJOR COMPONENT TYPES AFFECTING IBB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (D=AVG.) 0 50 100 150 200
INSTRUMENTATION AND CONTROLS TRANSMITTER	.4364 / .4375	5	11.43	45 / 45
INSTRUMENTATION AND CONTROLS SWITCH	.8275 / .8614	1	1.16	72 / 72 / 0
INSTRUMENTATION AND CONTROLS CONTROLLER	6.3967 / 6.4769	7	1.08	6 / 6
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	10.0700 / 13.8167	7	.51	20 / 10

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT

REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBC ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
SAFE FEATURES ACTUAT. SYS.	B&W	7	273.8	340.0	9982	0	.00	207	207	43
TOTAL		7	273.8	340.0	9982	0				43

MAJOR COMPONENT TYPES AFFECTING IBC SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS RESTORATION HOURS (=AVG.) (=AVG.)
INSTRUMENTATION AND CONTROLS TRANSMITTER	.3273 .3261	11	33.53	107 107
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.4834 .7339	9	12.26	180 180
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	10.4752 11.0545	10	.87	422 422
INSTRUMENTATION AND CONTROLS INDICATOR	1.4065 1.4121	1	.71	7 7
RELAYS 100-199 VDC	10.8551 10.8821	4	.37	55 55
INSTRUMENTATION AND CONTROLS CONTROLLER	16.2727 17.9205	4	.22	55 55
INSTRUMENTATION AND CONTROLS SWITCH	9.3728 12.4421	2	.16	192 192 0
RELAYS 100-199 VAC	14.5513 14.6912	2	.14	513 513

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

ON SYSTEM | ON PLANT

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NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEC OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
INTEGRATED CONTROL SYSTEM	B&W	2	39.2	77.6	6	0	.00	0	0	0
	TOTAL	2	39.2	77.6	6	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IED OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NON-NUCLEAR INSTRU.	B&W	5	258.0	259.9	14167	0	.00	462	462	17
TOTAL		5	258.0	259.9	14167	0				17

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING IED SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▬=AVG.) (0 1500 3000 4500 8000)	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
INSTRUMENTATION AND CONTROLS RECORDER	.3704 / .9866	1	2.57	4956 * 4956 0												
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	7.9095 / 8.5731	13	1.52	194 * 194												
INSTRUMENTATION AND CONTROLS INDICATOR	1.6881 / 1.7572	2	1.14	11 * 11												
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.3514 / 1.6293	1	.61	344 * 344 0												

PERCENT (0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100)

ON SYSTEM | ON PLANT

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NUCLEAR PLANT RELIABILITY DATA SYSTEM
IFA OTHER INSTR. SYS. NOT REQUIRED FOR SAFETY

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
IN-CORE INSTRUMENTATION	B&W	4	201.1	201.1	7625	0	.00	0	0	0
	TOTAL	4	201.1	201.1	7625	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MAB LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
WASTE DISPOSAL SYSTEM	B&W	10	349.9	477.3	4560	0	.00	101	101	14
TOTAL		10	349.9	477.3	4560	0				14

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING MAB SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 150 300 450 600)	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
CATEGORIES/FUNCTIONS					ON SYSTEM					ON PLANT						
PUMPS	.0666	2	29.95	10												
OTHER	.0666			10												
BLOWERS	.0727	3	28.30	35												
COMPRESSOR	.1060			35												
FILTERS/STRAINERS	.0363	1	18.87	14												
GAS	.0530			14												
INSTRUMENTATION AND CONTROLS	.0363	1	18.87	44												
SENSOR/DETECTOR/ELEMENT	.0530			44												
NON-PEDIGREE COMPONENTS	.0990	1	9.70	73												
SEE APPENDIX A . A02(15)	.1031			73												
PUMPS	.1527	1	4.43	237												
UNDER 500 GPM	.2258			237												
VALVE OPERATORS	.0644	2	2.91	81												
ELECTRIC MOTOR-AC	.6797			81												
VALVES	1.7026	1	.38	126												
ONE-WAY FLOW	2.6290			126												
ALL OTHERS	6.2591	2	.17	157												
	12.0606			157												

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PAF COMPRESSED AIR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
STATION SERVICE AIR	B&W	1	27.7	27.8	0	0	.00	211	211	3
TOTAL		1	27.7	27.8	0	0				3

MAJOR COMPONENT TYPES AFFECTING PAF SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 100 200 300 400)
VALVES	.1250	3	11.38	211
SHUTOFF.ISOLATION.STOP	.2637			211

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
	LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
	DEGRADED SYSTEM OPER.	UNIT OFF-LINE
	LOSS OF REDUNDANCY	REACTOR TRIP
	LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
	NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
		DAMAGE TO OTHER EQUIP.
		NO SIGNIFICANT EFFECT

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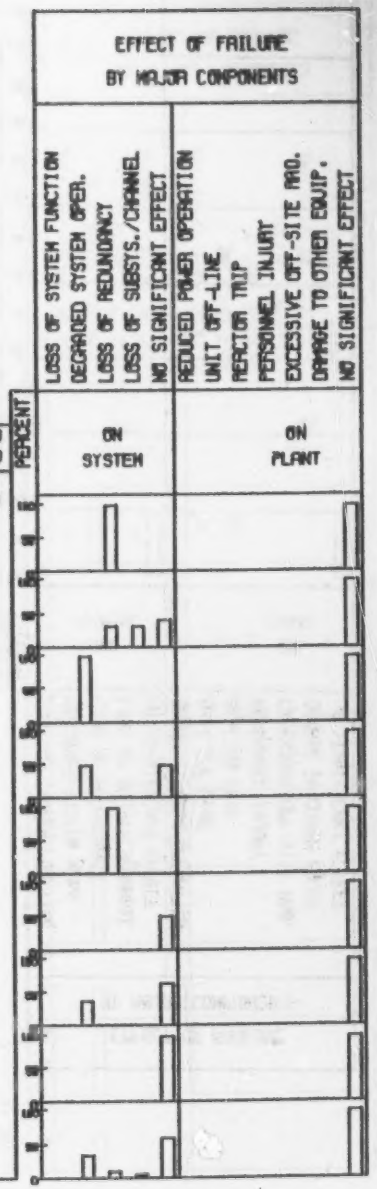
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCB CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
MAKEUP AND PURIF. SYSTEM	B&W	7	274.3	318.9	98	0	.00	473	473	81
TOTAL		7	274.3	318.9	98	0				81

MAJOR COMPONENT TYPES AFFECTING PCB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 2000 4000 6000 8000) (▭=AVG.) (▬=AVG.)
MOTORS 100-499 HP	.0273 .0547	1	18.29	672 672
PUMPS UNDER 500 GPM	.3221 .8672	10	11.53	640 640
VALVE OPERATORS ELECTRIC MOTOR-DC	.0000 .1094	1	9.14	4 4
VALVES FLOW CONTROL	1.0434 1.0993	10	6.67	275 275
PUMPS 500-2499 GPM	.0511 .1669	1	5.99	432 432
INSTRUMENTATION AND CONTROLS RECORDER	.2457 .3370	2	5.93	240 240
VALVE OPERATORS ELECTRIC MOTOR-AC	1.1209 3.4086	11	3.23	74 74
INSTRUMENTATION AND CONTROLS INDICATOR	2.1249 2.7262	8	2.93	699 699
ALL OTHERS	31.1734 49.7983	37	.74	15 15



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCC CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CHEMICAL ADDITION SYSTEM	B&W	4	123.3	163.8	43	0	.00	594	594	3
TOTAL		4	123.3	163.8	43	0				3

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

MAJOR COMPONENT TYPES AFFECTING PCC SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 500 1000 1500 2000)
PUMPS	.2335	1	3.47	1290
UNDER 500 GPM	.2691			1290
				0
VALVES	.8660	1	1.08	506
ONE-WAY FLOW	.9237			506
				0
VALVES	.8906	1	.63	47
SHUTOFF, ISOLATION, STOP	1.5870			47
				0

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCD CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
BORATED WATER STORAGE TANK	B&W	1	15.7	27.4	1296	0	.00	503	503	2
TOTAL		1	15.7	27.4	1296	0				2

MAJOR COMPONENT TYPES AFFECTING PCD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS ▭ (▪=AVG.) RESTORATION HOURS ▪▪▪ (□=AVG.) 0 250 500 750 1000
INSTRUMENTATION AND CONTROLS	.0507	1	18.86	21 ▪ 21 □
TRANSMITTER	.0530			
NON-PEDIGREE COMPONENTS	.1364	1	7.31	98 ▪ 98 □
SEE APPENDIX A . A02(15)	.1367			

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	ON SYSTEM: DEGRADED SYSTEM OPER.	ON SYSTEM: LOSS OF REDUNDANCY	ON SYSTEM: LOSS OF SUBSYS./CHANNEL	ON SYSTEM: NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	ON PLANT: UNIT OFF-LINE	ON PLANT: REACTOR TRIP	ON PLANT: PERSONNEL INJURY	ON PLANT: EXCESSIVE OFF-SITE RAD.	ON PLANT: DAMAGE TO OTHER EQUIP.	ON PLANT: NO SIGNIFICANT EFFECT
100					▭							▭
90					▭							▭
80												
70												
60												
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RAB REACTOR VESSEL INTERNALS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR INTERNALS	B&W	1	48.3	50.0	6	0	.00	0	0	0
TOTAL		1	48.3	50.0	6	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RBB REACTIVITY CONTROL SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTROL ROD DRIVE SYSTEM	B&W	8	341.8	392.6	18606	1	2.55	278	278	79
TOTAL		8	341.8	392.6	18606	1				79

MAJOR COMPONENT TYPES AFFECTING RBB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) 0 1000 2000 3000 4000
CONTROL ROD DRIVE MECHANISMS	20.5991 / 28.2563	78	2.76	281 / 281
LEAD SCREW/ROLLER NUT				
CIRCUIT CLOSERS/INTERRUPTERS	.1622 / 1.0611	1	.93	6 / 6
CIRCUIT BREAKER				

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RCC REACTOR CORE

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR CORE	B&W	7	240.6	327.6	2790	0	.00	0	0	0
	TOTAL	7	240.6	327.6	2790	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SAB REACTOR CONTAINMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR BLDG. PENETRATIONS	B&W	6	219.9	277.6	175	0	.00	851	851	37
TOTAL		6	219.9	277.6	175	0				37

EFFECT OF FAILURE BY MAJOR COMPONENTS

	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM						ON PLANT						

MAJOR COMPONENT TYPES AFFECTING SAB SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ = AVG.) RESTORATION HOURS (▬ = AVG.) (0 1500 3000 4500 6000)
BLOWERS	.0532 / .1112	2	17.98	144 / 144
FAN				
PENETRATIONS, PRIMARY CONT.	.4330 / .5397	8	14.99	82 / 82
PERSONNEL ACCESS				
VALVE OPERATORS	.2425 / .7957	11	13.83	170 / 170
PNEUMATIC/DIAPHRAGM/CYLINDER				
VALVES	.2664 / .2671	1	3.74	5469 / 5469
SAMPLE				
VALVES	.3916 / .5289	1	1.89	840 / 840
ONE-WAY FLOW				
VALVES	1.4538 / 3.1813	5	1.57	658 / 658
SHUTOFF, ISOLATION, STOP				
VALVE OPERATORS	.4996 / 1.1451	1	.87	144 / 144
ELECTRIC MOTOR-AC				
PENETRATIONS, PRIMARY CONT.	22.9682 / 24.0256	7	.29	1699 / 1699
ELECTRICAL				
ALL OTHERS	17.1689 / 19.1013	1	.05	144 / 144

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SBB CONTAINMENT HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR BLDG. COOLING SYS.	B&W	8	361.2	392.8	7379	0	.00	613	613	6
TOTAL		8	361.2	392.8	7379	0				6

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

MAJOR COMPONENT TYPES AFFECTING SBB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 500 1000 1500 2000)
ANNUNCIATOR MODULES	.1022	1	8.99	96
AUDIO/VISUAL	.1112			96
				0
MOTORS	.8777	3	3.05	554
25-99.9 HP	.9835			554
VALVES	.0375	1	1.57	1872
SHUTOFF, ISOLATION, STOP	.0366			1872
				0
BLOWERS	.7197	1	.67	48
FAN	1.1554			48
				0

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCB CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR BLDG.PURGE&VENT SYSTEMS	B&W	7	146.8	322.1	2258	0	.00	210	210	92
TOTAL		7	146.8	322.1	2258	0				92

MAJOR COMPONENT TYPES AFFECTING SCB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=-AVG.) RESTORATION HOURS (0-AVG.) (0 1500 3000 4500 6000)
MOTORS 100-499 HP	.3695 .4731	6	12.68	1138 1138
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.4613 2.2615	26	11.50	109 109
BLOWERS VENTILATOR	.0709 .1060	1	9.43	200 200
VALVES DRAIN	.1332 .1338	1	7.49	26 26
BLOWERS COMPRESSOR	.0006 .2120	1	4.72	209 209
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	.2029 .2121	1	4.72	135 135
VALVES FLOW CONTROL	.4048 .8897	4	4.50	134 134
VALVE OPERATORS ELECTRIC MOTOR-AC	.1484 2.8044	11	3.92	139 139
ALL OTHERS	42.1282 57.4757	41	.71	4 4

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCC CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
REACTOR BLDG. SPRAY SYS.	B&W	7	51.4	365.6	99	0	.00	124	248	26
TOTAL		7	51.4	365.6	99	0				26

MAJOR COMPONENT TYPES AFFECTING SCC SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (D=AVG.)
PUMPS 500-2499 GPM	.0098 .5911	7	11.84	92 92
PUMPS UNDER 500 GPM	.0783 .2313	2	8.65	92 92
MOTORS LESS THAN 1 HP	.0511 .1892	1	5.29	72 72
VALVE OPERATORS ELECTRIC MOTOR-AC	.3218 1.9457	5	2.57	134 134
MOTORS 100-499 HP	.0010 .0823	2	2.43	68 68
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.0356 1.1781	2	1.70	8 6
VALVES SHUTOFF, ISOLATION, STOP	2.8725 8.3990	5	.78	156 156
VALVES ONE-WAY FLOW	.6291 3.5506	2	.58	1972 245

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	26	
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SDA CONTAINMENT ISOLATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FLUID BLOCK SYSTEM	B&W	2	60.7	61.0	2322	0	.00	68	68	10
TOTAL		2	60.7	61.0	2322	0				10

MAJOR COMPONENT TYPES AFFECTING SDA SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 10 20 30 40	OUT-OF-SERVICE HOURS □ (=AVG.) RESTORATION HOURS ■ (D=AVG.) 0 100 200 300 400
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.2182 / .2187	6	27.43	68 / 68 / 68
INSTRUMENTATION AND CONTROLS TRANSMITTER	.2182 / .2187	2	9.14	8 / 8 / 0
INSTRUMENTATION AND CONTROLS SWITCH	.9314 / .9317	2	2.12	72 / 72 / 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SEC CONTAIN. COMBUSTIBLE GAS CONT. SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONT.COMB.GAS CONTROL SYS.	B&W	1	.1	27.3	12	0	.00	149	149	2
TOTAL		1	.1	27.3	12	0				2

MAJOR COMPONENT TYPES AFFECTING SEC SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▩ =AVG.) 0 100 200 300 400
BLOWERS FAN	.0545 .1091	1	9.14	33 33
VALVES SHUTOFF,ISOLATION,STOP	.1091 .2743	1	3.65	264 264

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
100	LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
90	DEGRADED SYSTEM OPER.	UNIT OFF-LINE
80	LOSS OF REDUNDANCY	REACTOR TRIP
70	LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
60	NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
50		DAMAGE TO OTHER EQUIP.
40		NO SIGNIFICANT EFFECT
30		
20		
10		
0		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFD EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
HIGH PRESS. INJ. SYSTEM	B&W	5	163.7	250.9	137	0	.00	778	778	71
TOTAL		5	163.7	250.9	137	0				71

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING SFD SYSTEMS	CF/CALENDAR HOURS:MILLION	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 2000 4000 6000 8000)
CATEGORIES/FUNCTIONS				
PUMPS 500-2499 GPM	.0000 / .0547	9	54.86	169 / 169
VALVES PRESSURE CONTROL	1.1657 / 1.7326	15	8.66	292 / 292
PUMPS UNDER 500 GPM	.3855 / .6724	4	5.95	2558 / 2558
MOTORS 500-999 HP	.3095 / .6888	4	5.81	978 / 978
VALVES 3-WAY SELECTOR	.1213 / .1740	1	5.75	5040 / 5040
VALVE OPERATORS ELECTRIC MOTOR-AC	.2561 / 3.5369	10	2.83	57 / 57
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.0002 / 2.3657	4	1.69	46 / 46
HEAT EXCHANGERS COOLER	.2803 / .7269	1	1.38	7007 / 7007
ALL OTHERS	15.2565 / 48.5523	29	.60	28 / 28

PERCENT

ON SYSTEM

ON PLANT

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NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFE EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CORE FLOODING SYSTEM	BWR	7	.2	342.8	2492	0	.00	212	212	19
TOTAL		7	.2	342.8	2492	0				19

MAJOR COMPONENT TYPES AFFECTING SFE SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.)
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.6765 / 1.7332	9	5.19	280 / 280
VALVES SHUTOFF, ISOLATION, STOP	1.3114 / 2.6136	6	2.30	162 / 182
VALVES PRESSURE RELIEF	.4481 / .6190	1	1.61	403 / 403
VALVES ONE-WAY FLOW	1.2701 / 2.0162	2	.99	44 / 44
VALVE OPERATORS ELECTRIC MOTOR-AC	.4014 / 2.0803	1	.48	216 / 216

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	ON SYSTEM	REDUCED POWER OPERATION	ON PLANT
DEGRADED SYSTEM OPER.		UNIT OFF-LINE	
LOSS OF REDUNDANCY		REACTOR TRIP	
LOSS OF SUBSYS./CHANNEL		PERSONNEL INJURY	
NO SIGNIFICANT EFFECT		EXCESSIVE OFF-SITE RAD.	
		DAMAGE TO OTHER EQUIP.	
		NO SIGNIFICANT EFFECT	

PERCENT

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NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFF EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
LOW PRESS. INJ. SYSTEM	B&W	3	49.1	173.9	2798	0	.00	501	501	44
TOTAL		3	49.1	173.9	2798	0				44

MAJOR COMPONENT TYPES AFFECTING SFF SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 1500 3000 4500 6000)
PUMPS UNDER 500 GPM	.0377 / .1966	2	10.18	349 / 349
PUMPS 2500-9999 GPM	.0605 / .3256	3	9.21	676 / 676
VALVE OPERATORS ELECTRIC MOTOR-AC	.3728 / 3.6310	19	5.23	150 / 150
VALVES SHUTOFF,ISOLATION,STOP	2.9099 / 4.6829	16	3.43	833 / 833
VALVES PRESSURE RELIEF	.9728 / .9765	2	2.05	1256 / 1256
VALVES VENT	.2259 / .7613	1	1.31	120 / 120
VALVES BYPASS	.2480 / 2.5520	1	.39	503 / 503

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

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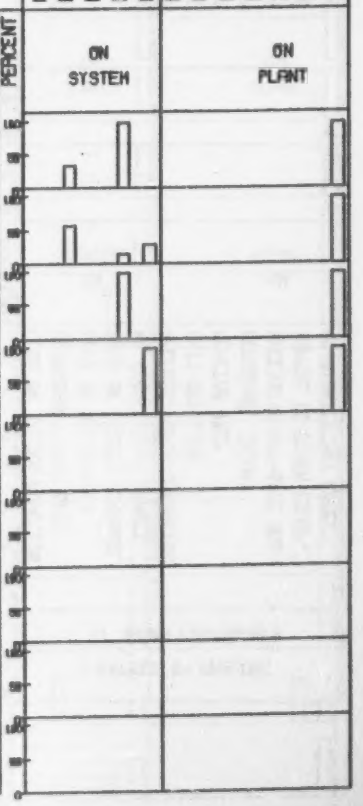
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SGA CONTROL ROOM HABITABILITY SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONT.ROOM HABITABITY SYS.	B&W	1	27.4	27.4	12	0	.00	278	278	12
TOTAL		1	27.4	27.4	12	0				12

MAJOR COMPONENT TYPES AFFECTING SGA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 500 1000 1500 2000)
INSTRUMENTATION AND CONTROLS	.1091	9	27.43	519
SENSOR/DETECTOR/ELEMENT	.1094			519
VALVES	.0273	7	11.64	210
SHUTOFF.ISOLATION.STOP	.6015			210
HEAT EXCHANGERS	.0273	1	9.14	116
CONDENSER	.1094			116 / 0
VALVE OPERATORS	.5455	1	1.83	196
PNEUMATIC/DIAPHRAGM/CYLINDER	.5468			196 / 0

EFFECT OF FAILURE BY MAJOR COMPONENTS



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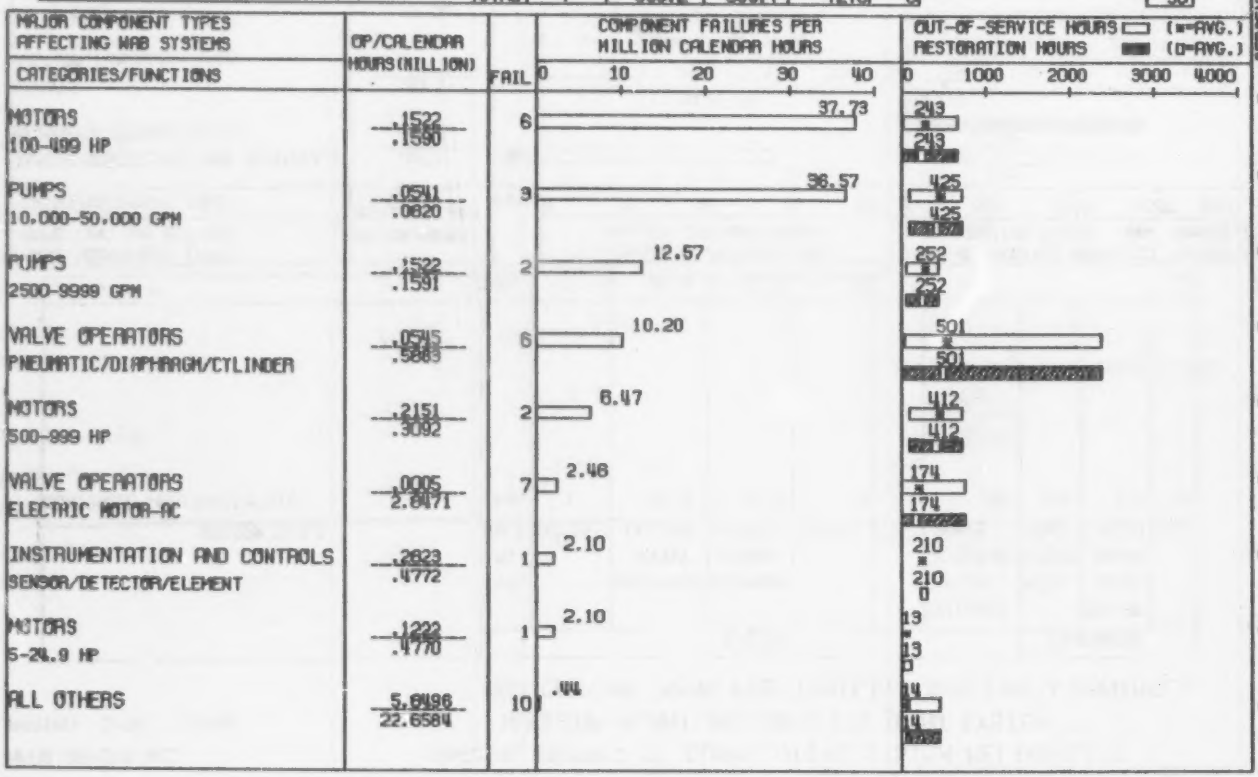
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WAB STATION SERVICE WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
LOW PRESS.SERV.WATER SYS.	B&W	7	339.2	353.7	7276	0	.00	260	260	38
TOTAL		7	339.2	353.7	7276	0				38



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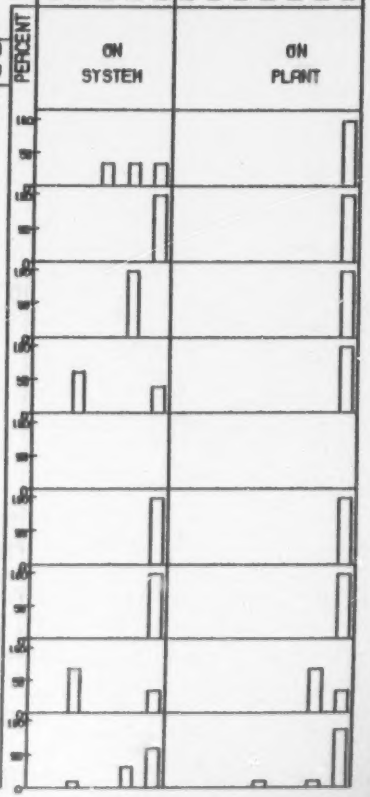
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WBB COOLING SYSTEMS FOR REACTOR AUXILIARIES & CON

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
COMPONENT COOLING SYSTEM	B&W	11	351.7	501.1	4576	0	.00	172	172	28
TOTAL		11	351.7	501.1	4576	0				28

MAJOR COMPONENT TYPES AFFECTING WBB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▬=AVG.) 0 200 400 600 800
PUMPS 2500-9999 GPM	.1642 .3492	3	8.59	219 249
MOTORS LESS THAN 1 HP	.0016 .2643	2	7.57	119 119
MOTORS 100-499 HP	.1919 .3626	1	2.61	527 527
VALVE OPERATORS ELECTRIC MOTOR-AC	.4206 2.3617	5	2.12	79 79
VALVES SAMPLE	.0001 .7520	1	1.33	576 576
VALVES DRAIN	.4357 1.9578	2	1.02	26 26
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.2096 1.3689	1	.73	237 237
VALVES ONE-WAY FLOW	2.7565 4.6295	3	.62	313 313
ALL OTHERS	20.6537 48.2401	10	.21	11 11

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WGA OTHER AUXILIARY WATER SYSTEMS & THEIR CONTROL

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CHILLED WATER SYSTEM	B&W	1	51.1	53.4	0	0	.00	0	0	0
TOTAL		1	51.1	53.4	0	0				0

ANNUAL REPORT OF CUMULATIVE SYSTEM RELIABILITY (A02) FOR COMBUSTION ENGINEERING UNITS

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAB AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONT. PEN. ROOM VENT. SYS.	CE	2	4.1	89.8	51	0	.00	1230	1230	5
TOTAL		2	4.1	89.8	51	0				5

MAJOR COMPONENT TYPES AFFECTING AAB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1000 2000 3000 4000)
VALVES	.0000	3	17.51	1327
FLOW CONTROL	.1715			1327
INSTRUMENTATION AND CONTROLS	.3524	1	2.70	27
TRANSMITTER	.3706			27
VALVES	.0000	1	2.50	2140
3-WAY SELECTOR	.3997			2140

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAC AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PLANT VENTILATION SYSTEM	CE	4	199.7	232.5	71	0	.00	917	917	11
TOTAL		4	199.7	232.5	71	0				11

MAJOR COMPONENT TYPES AFFECTING AAC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG. ▬=D-AVG.) (0 2000 4000 6000 8000)
VALVES ONE-WAY FLOW	.0979 / .2023	1	4.94	6279 ▬ 6279 □
HEAT EXCHANGERS COOLER	.8338 / .8359	4	4.79	278 □ 278 ▬ 278 □ 278
MOTORS 5-24.9 HP	.4029 / .6380	2	3.13	1361 ▬ 1361 □
VALVES 3-WAY SELECTOR	.0440 / .5008	1	2.00	26 ▬ 26
BLOWERS FAN	.5714 / .7378	1	1.36	746 ▬ 746 □
INSTRUMENTATION AND CONTROLS SWITCH	1.6326 / 2.0641	1	.48	8 ▬ 8 □
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	1.9351 / 2.1473	1	.47	

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	100	
DEGRADED SYSTEM OPER.	50	
LOSS OF REDUNDANCY	50	
LOSS OF SUBSYS./CHANNEL	50	
NO SIGNIFICANT EFFECT	100	
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT	100	

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ABB FIRE PROTECTION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PLANT FIRE PROTECTION	CE	2	66.0	109.9	682	0	.00	501	501	4
TOTAL		2	66.0	109.9	682	0				4

MAJOR COMPONENT TYPES AFFECTING ABB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE RESTORATION HOURS (0 200 400 600 800) ▭ (=AVG.) ▬ (D=AVG.)
VALVES	.1315 / .1318	3	22.77	499 = 499
ONE-WAY FLOW				
VALVES	.0000 / .0496	1	20.15	507 = 507
PRESSURE CONTROL				

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CAF REACTOR VESSELS & APPURTENANCES

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR VESSEL	CE	3	79.8	99.1	289	0	.00	0	0	0
TOTAL		3	79.8	99.1	289	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBG COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR COOLANT SYSTEM	CE	7	291.2	315.2	35785	1	3.17	574	574	92
TOTAL		7	291.2	315.2	35785	1				92

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING CBG SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (□ = AVG.) RESTORATION HOURS (■ = AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
PUMPS OVER 50,000 GPM	.7072 / .8094	11	12.18	658 / 658		
VALVES FLOW CONTROL	.1609 / .2160	2	9.26	12 / 12		
VALVE OPERATORS SOLENOID-AC	.1233 / .1316	1	7.59	4222 / 4222		
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.1311 / .1762	1	5.67	6 / 6		
HEAT EXCHANGERS STEAM GENERATOR	.5521 / .6083	3	4.62	2375 / 2375		
VALVES PRESSURE CONTROL	.3501 / .4049	2	4.12	19 / 19		
VALVES PRESSURE RELIEF	1.2828 / 1.5068	5	3.31	423 / 423		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	0.1834 / 0.7277	28	2.98	448 / 448		
ALL OTHERS	45.0897 / 51.1049	41	.80	2 / 2		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CFD RESIDUAL HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEM SYSTEMS	SYSTEM OPERATING HOURS (X1000)	SYSTEM CALENDAR HOURS (X1000)	SYSTEM TESTS	SYSTEM FAIL	SYSTEM FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
SHUTDOWN COOLING SYSTEM	CE	7	53.5	291.3	11580	1	3.43	3257	3257	3
TOTAL		7	53.5	291.3	11580	1				3

MAJOR COMPONENT TYPES AFFECTING CFD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS (▭ a=AVG.) RESTORATION HOURS (▬ d=AVG.) 0 2000 4000 6000 8000
MOTORS 5-24.9 HP	.0000 .0571	1	17.51	7159 a=7159 d=0
MOTORS OTHER	.0000 .1142	1	8.75	2602 a=2602 d=0
VALVES PRESSURE RELIEF	.0029 .2189	1	4.57	16 a=16 d=0

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM				ON PLANT						
	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXTENSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
MOTORS 5-24.9 HP											
MOTORS OTHER											
VALVES PRESSURE RELIEF											

PERCENT 100 90 80 70 60 50 40 30 20 10 0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBC AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STATION POWER DIST. SYSTEM	CE	19	736.7	769.2	12713	0	.00	180	202	30
TOTAL		19	736.7	769.2	12713	0				30

MAJOR COMPONENT TYPES AFFECTING EBC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 500 1000 1500 2000)
BATTERIES & CHARGERS STATION BATTERY	.0000 / .1142	1	8.75	0 ▬ 0 0
BATTERIES & CHARGERS OTHER	.2278 / .2284	1	4.38	214 ▬ 214 0
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	34.6389 / 53.4703	26	.48	223 ▬ 197
CIRCUIT CLOSERS/INTERRUPTERS CONTACTOR	4.1330 / 5.4313	2	.37	25 ▬ 25

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT: 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBH AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
A.C. INSTRUMENT POWER SYSTEM	CE	3	86.3	86.7	4703	0	.00	0	0	0
TOTAL		3	86.3	86.7	4703	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ECE DC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
D.C. INSTRUMENT POWER SYSTEM	CE	3	85.2	86.0	4697	0	.00	29	29	5
TOTAL		3	85.2	86.0	4697	0				5

MAJOR COMPONENT TYPES AFFECTING ECE SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS / RESTORATION HOURS (0 15 30 45 60) (□=AVG.) (▪=AVG.)
BATTERIES & CHARGERS	.6031	3	4.66	40
STATION BATTERY	.6175			40
BATTERIES & CHARGERS	.6130	2	3.19	13
OTHER	.6275			13

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EDB ONSITE POWER SYS. & CONT. (COMPOSITE AC&DC)

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EMERGENCY POWER SOURCES	CE	16	355.8	694.1	8499	0	.00	200	200	41
TOTAL		16	355.8	694.1	8499	0				41

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING EDB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 250 500 750 1000)	PERCENT ON SYSTEM	PERCENT ON PLANT
ENGINES, INTERNAL COMBUSTION DIESEL OR NO.2 FUEL OIL	.1113 / .3690	17	46.07	54 ■ 54		
HEAT EXCHANGERS COOLER	.3724 / .3961	9	22.72	11 ■ 11		
VALVES ONE-WAY FLOW	.2178 / .7093	7	9.86	837 ■ 837		
MECHANICAL FUNCTION UNITS ENGINE CONTROL	.0025 / .2203	2	9.08	4 ■ 4		
GENERATORS ALTERNATOR	.2686 / .3632	1	2.75	726 ■ 726 □		
RELAYS 100-199 VDC	5.2900 / 5.7062	4	.70	71 ■ 71		
INSTRUMENTATION AND CONTROLS SWITCH	3.9024 / 7.1566	1	.14	316 ■ 316 □		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EED EMERGENCY GENERATOR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
DIESEL STANDBY POWER SYSTEM	CE	1	2.1	44.6	260	0	.00	58	58	5
TOTAL		1	2.1	44.6	260	0				5

MAJOR COMPONENT TYPES AFFECTING EED SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (▩=AVG.) (0 100 200 300 400)
CIRCUIT CLOSERS/INTERRUPTERS	.0000 / .0881	4	45.40	7 / 7
SWITCHGEAR				
GENERATORS	.0009 / .0441	1	22.70	262 / 262 / 0
ALTERNATOR				

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
	ON SYSTEM					ON PLANT						
60												
55												
50												
45												
40												
35												
30												
25												
20												
15												
10												
5												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FCC SPENT FUEL POOL COOLING & CLEANUP SYS. &CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SPENT FUEL POOL COOL. SYS.	CE	4	170.0	216.2	407	0	.00	506	506	7
TOTAL		4	170.0	216.2	407	0				7

MAJOR COMPONENT TYPES AFFECTING FCC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 500 1000 1500 2000)
PUMPS UNDER 500 GPM	.1541 / .4160	4	9.57	466 / 466
MECHANICAL FUNCTION UNITS ALIGNMENT DEVICE (COUPLING)	.0326 / .1977	1	5.06	298 / 298
VALVES SHUTOFF, ISOLATION, STOP	3.3190 / 4.9158	20	.41	688 / 689

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT: 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FOE FUEL HANDLING SYSTEMS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL HANDLING SYSTEM	CE	1	1.8	44.2	5	0	.00	0	0	0
TOTAL		1	1.8	44.2	5	0				0

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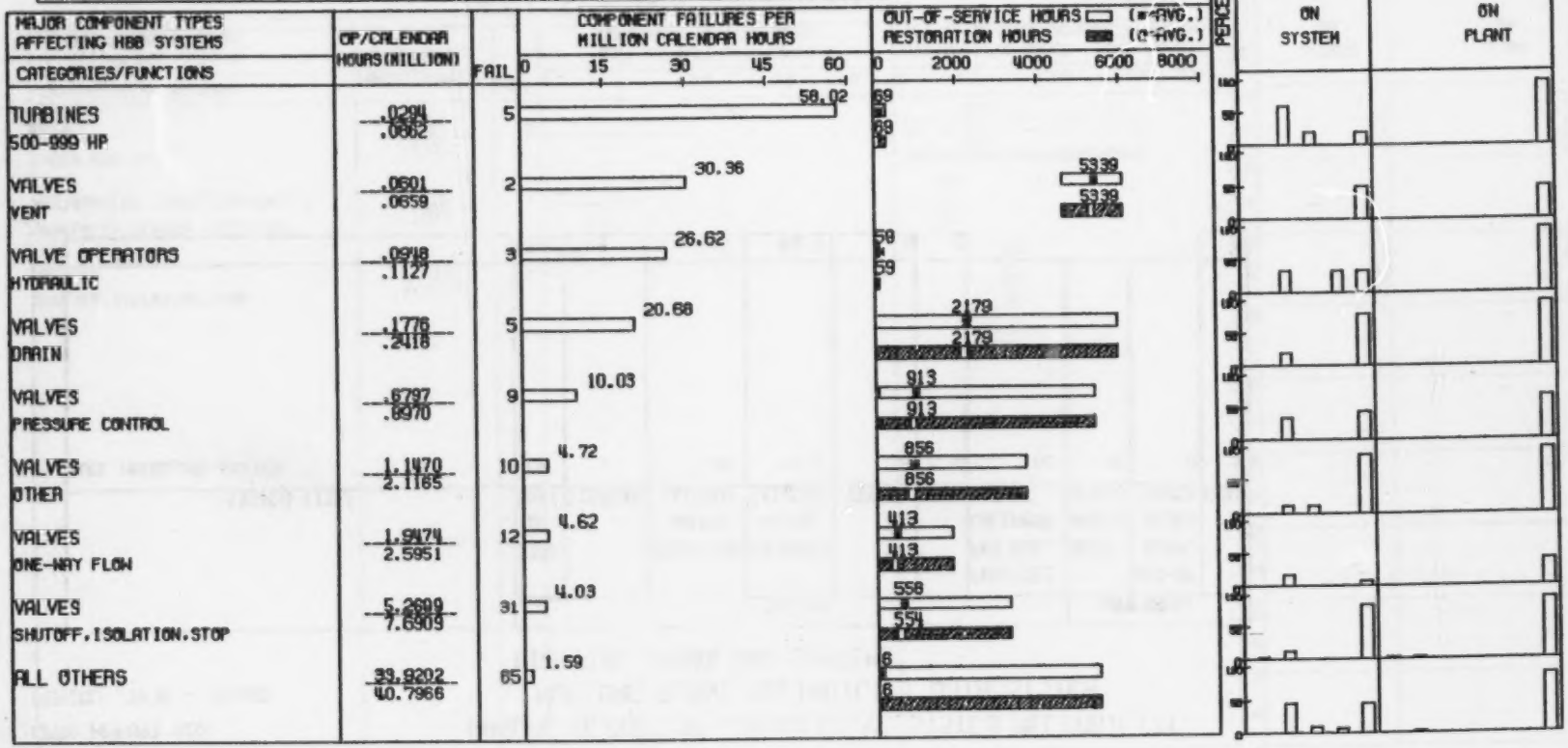
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HBB MAIN STEAM SUPPLY SYSTEM & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STEAM AND FEEDWATER SYSTEM	CE	13	620.4	709.4	18120	0	.00	595	595	142
TOTAL		13	620.4	709.4	18120	0				142



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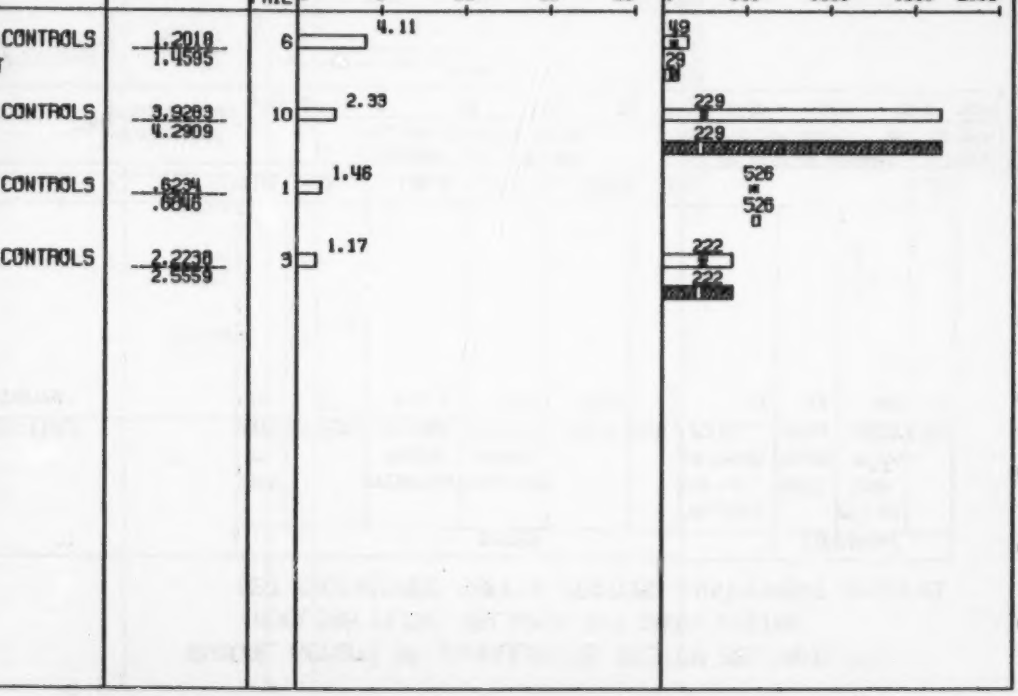
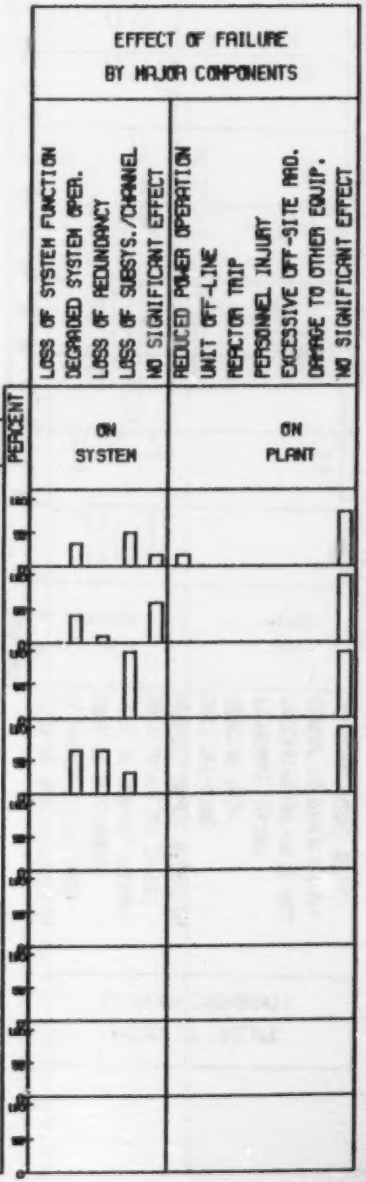
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IAC REACTOR TRIP SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NUCLEAR INSTRUMENTATION	CE	3	123.7	136.9	17092	1	7.30	183	189	20
TOTAL		3	123.7	136.9	17092	1				20

MAJOR COMPONENT TYPES AFFECTING IAC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	1.2018 / 1.4595	6
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	3.9283 / 4.2909	10
INSTRUMENTATION AND CONTROLS SWITCH	.6234 / .6846	1
INSTRUMENTATION AND CONTROLS INDICATOR	2.2230 / 2.5559	3





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBD ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR PROTECTION SYSTEM	CE	3	124.2	136.4	13540	0	.00	118	200	51
TOTAL		3	124.2	136.4	13540	0				51

MAJOR COMPONENT TYPES AFFECTING IBD SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1500 3000 4500 6000)
CIRCUIT CLOSERS/INTERRUPTERS	.6520	7	8.42	61
CIRCUIT BREAKER	.6311			61
INSTRUMENTATION AND CONTROLS	4.6858	17	3.27	288
SWITCH	5.1918			111
INSTRUMENTATION AND CONTROLS	1.1197	2	1.66	66
OTHER	1.2012			66
INSTRUMENTATION AND CONTROLS	.8304	1	1.53	64
TRANSMITTER	.8501			64
				0
INSTRUMENTATION AND CONTROLS	5.8930	8	1.29	312
SENSOR/DETECTOR/ELEMENT	6.2204			312
INSTRUMENTATION AND CONTROLS	.7495	1	1.18	26
INDICATOR	.8472			26
				0
INSTRUMENTATION AND CONTROLS	9.3771	10	1.00	102
COMPUTATION MODULE	10.0202			102
INSTRUMENTATION AND CONTROLS	6.3677	4	.59	2
POWER SUPPLY	6.7590			2
ALL OTHERS	2.0027	1	.33	1061
	9.0071			1061

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
100												
90												
80												
70												
60												
50												
40												
30												
20												
10												
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBE ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
ENGINEERED SAFETY FEATURE	CE	1	35.4	35.4	4506	0	.00	17	17	18
TOTAL		1	35.4	35.4	4506	0				18

MAJOR COMPONENT TYPES AFFECTING IBE SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 100 200 300 400)
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.9253 / .8320	9	3.22	9 / 9
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	7.5890 / 9.9606	11	1.10	4 / 4
INSTRUMENTATION AND CONTROLS POWER SUPPLY	2.1181 / 2.4370	2	.82	10 / 10
INSTRUMENTATION AND CONTROLS INDICATOR	3.0085 / 9.1911	1	.32	207 * / 207 □
RELAYS LESS THAN 50 VDC	5.6375 / 7.5772	1	.13	5 / 5

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEE OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
OPERATING CONTROL STATIONS	CE	1	54.9	57.0	12	0	.00	0	0	0
	TOTAL	1	54.9	57.0	12	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEF OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NON-NUCLEAR PROCESS INSTR.	CE	1	29.4	35.4	4414	0	.00	0	0	0
	TOTAL	1	29.4	35.4	4414	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IFB OTHER INSTR. SYS. NOT REQUIRED FOR SAFETY

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
IN-CORE INSTRUMENTATION	CE	1	32.8	44.0	5810	0	.00	0	0	0
TOTAL		1	32.8	44.0	5810	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MAC LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
WASTE MANAG.SYS.(LIQUID)	CE	4	149.5	202.0	11595	0	.00	656	658	19
TOTAL		4	149.5	202.0	11595	0				19

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING MAC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 1000 2000 3000 4000) (▭ =AVG.) (▬ =AVG.)	LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
					ON SYSTEM					ON PLANT						
PUMPS 2500-9999 GPM	.0555 / .1318	1	7.59	132 / 132												
VALVES DRAIN	.1561 / .1652	1	6.05	32 / 32												
VALVE OPERATORS ELECTRIC MOTOR-AC	.1561 / .1651	1	6.06	2500 / 2500												
INSTRUMENTATION AND CONTROLS TRANSMITTER	.2146 / .5139	1	3.19	6 / 6												
INSTRUMENTATION AND CONTROLS SWITCH	.8640 / 1.2826	4	3.12	488 / 488												
VALVES 3-WAY SELECTOR	.0000 / .0586	2	2.39	1267 / 1267												
VALVES SHUTOFF,ISOLATION,STOP	1.9927 / 5.3905	9	1.69	589 / 589												

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MBB GASEOUS RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (P/G)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
WASTE MANAG.SYS.(GASEOUS)	CE	2	92.5	92.5	4420	0	.00	1697	1697	1
TOTAL		2	92.5	92.5	4420	0				1

MAJOR COMPONENT TYPES AFFECTING MBB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ D=AVG.) (0 500 1000 1500 2000)
RECOMBINERS	.0000	1	7.83	1697
AIR	.1277			1697

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 5 10 15 20 25 30 35 40 45 50 55 60 65

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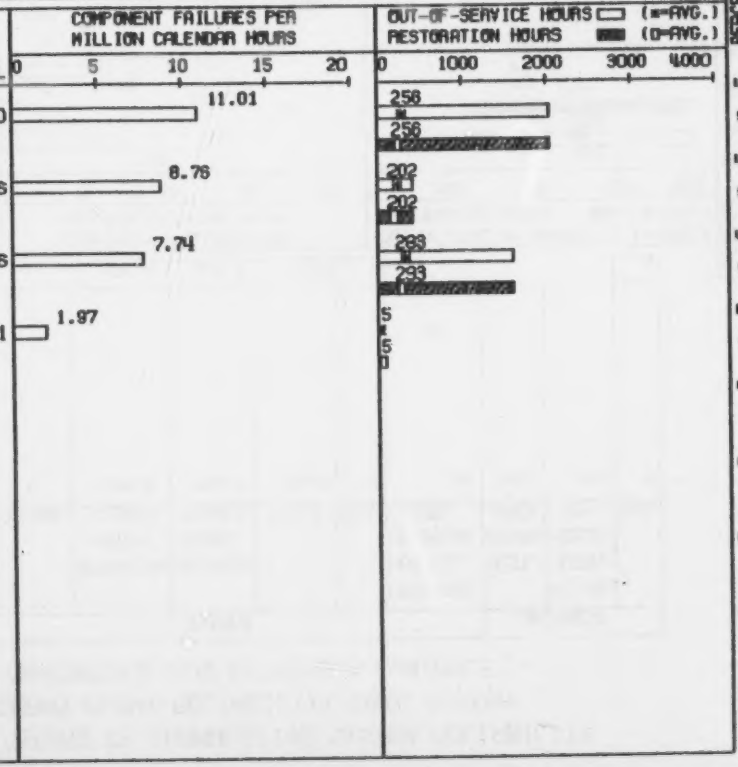
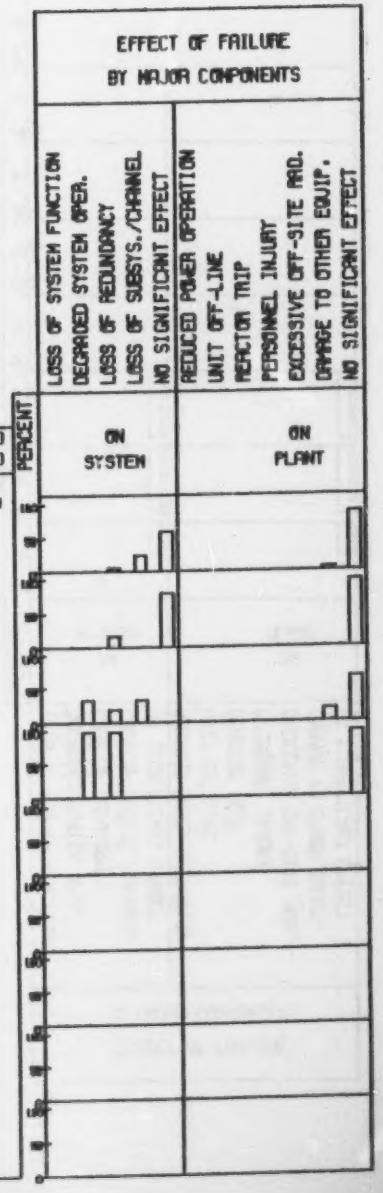
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MCB PROCESS & EFFLUENT RAD. MONITORING SYS.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
RADIATION MONITORING SYS.	CE	2	89.9	101.0	7954	0	.00	245	245	33
TOTAL		2	89.9	101.0	7954	0				33

MAJOR COMPONENT TYPES AFFECTING MCB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.)
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	1.7949 / 1.8167	20	11.01	256 / 256
INSTRUMENTATION AND CONTROLS CONTROLLER	.6835 / .6852	6	8.76	202 / 202
INSTRUMENTATION AND CONTROLS INDICATOR	.7382 / .7749	6	7.74	283 / 293
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.4879 / .5065	1	1.97	5 / 5





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PAB COMPRESSED AIR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
COMPRESSED AIR SYSTEM	CE	6	308.8	324.7	9225	0	.00	201	201	4
TOTAL		6	308.8	324.7	9225	0				4

MAJOR COMPONENT TYPES AFFECTING PAB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 100 200 300 400) (▭=AVG.) (▬=AVG.)
VALVES ONE-WAY FLOW	.2247 .2658	2	7.00	253 253
INSTRUMENTATION AND CONTROLS SWITCH	.1894 .1984	1	5.04	172 172
VALVES SHUTOFF.ISOLATION.STOP	1.4631 1.7354	1	.58	123 123

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PBB PROCESS SAMPLING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SAMPLING SYSTEM	CE	4	156.1	202.2	8093	0	.00	226	226	1
TOTAL		4	156.1	202.2	8093	0				1

MAJOR COMPONENT TYPES AFFECTING PBB SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 100 200 300 400)
CATEGORIES/FUNCTIONS				
VALVE OPERATORS	.0002 / .0496	1	20.16	226 ■ 226 0
MECH. (DIFF. PRES. TO O/S FORCE CL)				

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT: 100 90 80 70 60 50 40 30 20 10 0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCF CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CHEMICAL & VOL.CONTR.SYS.	CE	10	389.8	430.5	23832	0	.00	413	413	204
TOTAL		10	389.8	430.5	23832	0				204

MAJOR COMPONENT TYPES AFFECTING PCF SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 20 40 60 80)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (D=AVG.) (0 2500 5000 7500 10000)
PUMPS UNDER 500 GPM	7192 / 1.7539	128	72.98	70 / 70
VALVE OPERATORS SOLENOID-DC	.3345 / .6194	7	11.90	611 / 611
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	.7382 / .8092	5	6.18	665 / 665
VALVES PRESSURE CONTROL	.7499 / 1.1250	6	5.33	800 / 800
MOTORS 500-999 HP	.0601 / .1977	1	5.08	30 / 30
VALVES PRESSURE RELIEF	2.8717 / 3.3019	15	4.54	676 / 664
MOTORS 100-499 HP	.2019 / .3156	1	3.17	666 / 666 / 0
VALVES FLOW CONTROL	4.9727 / 6.5296	13	1.99	350 / 350
ALL OTHERS	64.3464 / 86.3648	28	.32	85 / 85

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RBC REACTIVITY CONTROL SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTROL ROD DRIVE MECH.	CE	3	108.2	136.7	6453	5	36.58	638	638	79
TOTAL		3	108.2	136.7	6453	5				79

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING RBC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 1000 2000 3000 4000) (▭=AVG.) (▬=AVG.)
CONTROL ROD DRIVE MECHANISMS RACK AND PINION	1.6525 2.5095	71	27.63	710 705
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	.0623 .0881	1	11.35	8 8
CONTROL ROD DRIVE MECHANISMS MAGNETIC JACK LATCH	5.0193 5.5656	5	.90	4 4
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.0230 2.0020	2	.82	1 1

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

ON SYSTEM | ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RCB REACTOR CORE

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR CORE	CE	4	127.0	164.8	2039	0	.00	0	0	0
TOTAL		4	127.0	164.8	2039	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SAD REACTOR CONTAINMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONTAINMENT SYSTEM, INCL. PENETRATIONS	CE	9	273.4	397.6	11628	0	.00	339	339	20
TOTAL		9	273.4	397.6	11628	0				20

MAJOR COMPONENT TYPES AFFECTING SAD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (▬=AVG.) (0 1000 2000 3000 4000)
PENETRATIONS, PRIMARY CONT. PERSONNEL ACCESS	.2122 .2241	4	17.85	589 569
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.3122 .3303	4	12.11	26 26
VALVE OPERATORS ELECTRIC MOTOR-AC	.1583 .6546	1	1.53	41 41 0
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	1.0069 1.0570	1	.95	1249 1249 0
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.4329 1.5082	1	.66	2570 2570 0
VALVE OPERATORS SOLENOID-DC	.4738 1.5858	1	.63	29 29 0
PENETRATIONS, PRIMARY CONT. ELECTRICAL	6.2164 6.5439	5	.59	34 34 0
VALVES SHUTOFF, ISOLATION, STOP	1.5077 2.4896	1	.40	268 268 0
ALL OTHERS	24.8624 29.7618	2	.07	19 19 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	1	
DEGRADED SYSTEM OPER.	1	
LOSS OF REDUNDANCY	1	
LOSS OF SUBSYS./CHANNEL	1	
NO SIGNIFICANT EFFECT	1	
REDUCED POWER OPERATION		1
UNIT OFF-LINE		1
REACTOR TRIP		1
PERSONNEL INJURY		1
EXCESSIVE OFF-SITE RAD.		1
DAMAGE TO OTHER EQUIP.		1
NO SIGNIFICANT EFFECT		1

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SBC CONTAINMENT HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTAINMENT EMERG. COOLING	CE	3	107.6	118.1	179	0	.00	5100	5100	2
TOTAL		3	107.6	118.1	179	0				2

MAJOR COMPONENT TYPES AFFECTING SBC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG.) (▪=AVG.) (0 1500 3000 4500 6000)
VALVES SHUTOFF.ISOLATION.STOP	.1759 / .3525	2	5.67	5100 / 5100

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCD CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTAINMENT SPRAY SYSTEMS	CE	7	90.3	291.1	11970	0	.00	1208	1208	12
TOTAL		7	90.3	291.1	11970	0				12

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

PERCENT — ON SYSTEM — ON PLANT

MAJOR COMPONENT TYPES AFFECTING SCD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (D=AVG.) (0 2000 4000 6000 8000)
PUMPS 2500-9999 GPM	.2309 / .2604	2	7.45	209 / 209
VALVES FLOW CONTROL	.1788 / .5329	2	3.75	1037 / 1037
VALVE OPERATORS SOLENOID-DC	.1581 / .2793	1	3.58	74 / 74
INSTRUMENTATION AND CONTROLS INDICATOR	.6069 / .8291	2	2.15	1832 / 1832
VALVE OPERATORS ELECTRIC MOTOR-AC	.3506 / .7471	1	1.34	82 / 82
NON-PEDIGREE COMPONENTS SEE APPENDIX A . R02(15)	2.0978 / 2.1030	2	.95	11 / 11
VALVES SHUTOFF,ISOLATION,STOP	2.9858 / 5.5361	20	.36	4082 / 4082

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SEB CONTAIN. COMBUSTIBLE GAS CONT. SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
NITROGEN GAS SYSTEM	CE	5	180.4	250.5	.13580	0	.00	218	218	2
TOTAL		5	180.4	250.5	13580	0				2

MAJOR COMPONENT TYPES AFFECTING SEB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ = AVG.) RESTORATION HOURS (▬ = AVG.) (0 100 200 300 400)
VALVES	3521 / .4744	2	4.22	218 / 218
ONE-WAY FLOW				

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
	LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
	DEGRADED SYSTEM OPER.	UNIT OFF-LINE
	LOSS OF REDUNDANCY	REACTOR TRIP
	LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
	NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
		DAMAGE TO OTHER EQUIP.
		NO SIGNIFICANT EFFECT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFG EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SAFETY INJECTION SYSTEM	CE	8	155.9	348.2	24339	0	.00	587	587	82
TOTAL		8	155.9	348.2	24339	0				82

MAJOR COMPONENT TYPES AFFECTING SFG SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG.) (▪=AVG.) (0 2500 5000 7500 10000)
VALVE OPERATORS SOLENOID-DC	.0036 / 1.0147	18	17.74	957 / 957
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	.6313 / 1.0170	3	2.95	21 / 21
PUMPS UNDER 500 GPM	.1324 / .6891	2	2.90	1513 / 1513
INSTRUMENTATION AND CONTROLS TRANSMITTER	2.8205 / 2.9394	7	2.39	194 / 194
INSTRUMENTATION AND CONTROLS CONTROLLER	.0113 / .0136	2	2.19	346 / 346
INSTRUMENTATION AND CONTROLS INDICATOR	2.9953 / 3.1262	6	1.92	27 / 27
PUMPS 2500-9999 GPM	.0401 / .5523	1	1.81	760 / 760
VALVES OTHER	.1909 / 3.1262	5	1.60	1253 / 1253
ALL OTHERS	50.6508 / 83.0176	38	.45	13 / 13

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT (0 10 20 30 40 50 60)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WAC STATION SERVICE WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SERVICE WATER SYSTEM	CE	6	254.1	266.0	16293	0	.00	531	531	31
TOTAL		6	254.1	266.0	16293	0				31

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING WAC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (▬=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
MOTORS	.0380 / .0571	1	17.51	2279 / 2279 / 0		
OTHER						
FILTERS/STRAINERS	.1428 / .2421	4	18.52	350 / 350		
LIQUID						
INSTRUMENTATION AND CONTROLS	.0483 / 1.2056	6	4.98	14 / 14		
INDICATOR						
VALVES	.0055 / 1.0414	7	4.66	1084 / 1084		
ONE-WAY FLOW						
PUMPS	.0658 / .2695	1	3.79	1 / 1		
UNDER 500 GPM						
VALVES	.5141 / 1.5941	2	1.25	36 / 36		
FLOW CONTROL						
INSTRUMENTATION AND CONTROLS	.1399 / 1.2056	1	.83	87 / 87		
TRANSMITTER						
VALVE OPERATORS	.5188 / 4.8468	4	.83	149 / 149		
PNEUMATIC/DIAPHRAGM/CYLINDER						
ALL OTHERS	18.5685 / 25.5429	5	.20	174 / 174		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WBC COOLING SYSTEMS FOR REACTOR AUXILIARIES & CON

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
COMPONENT COOLING SYSTEM	CE	8	381.9	407.2	11298	0	.00	600	617	27
TOTAL		8	381.9	407.2	11298	0				27

MAJOR COMPONENT TYPES AFFECTING WBC SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□ =AVG.) (■ =AVG.) (0 1500 3000 4500 6000)
PUMPS UNDER 500 GPM	.1218 / .2635	2	7.59	111 / 111
MOTORS 100-499 HP	.3676 / .5670	4	7.05	272 / 272
VALVE OPERATORS OTHER	.1561 / .1651	1	6.06	555 / 555
PUMPS 2500-9999 GPM	.2489 / .3799	1	2.63	1343 / 887
VALVE OPERATORS SOLENOID-DC	.3787 / .3969	1	2.52	2 / 2
VALVE OPERATORS ELECTRIC MOTOR-AC	.4949 / .5057	1	1.98	2502 / 2502
HEAT EXCHANGERS COOLER	.8672 / .9669	1	1.03	5875 / 5875
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	5.4783 / 7.1329	4	.56	50 / 50
ALL OTHERS	50.2516 / 60.2058	12	.20	24 / 24

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSTS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WCB DEMINERALIZED WATER MAKE-UP SYSTEMS & CONT.

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
PRIMARY MAKEUP WATER SYSTEM	CE	2	95.5	101.4	4414	0	.00	0	0	0
TOTAL		2	95.5	101.4	4414	0				0

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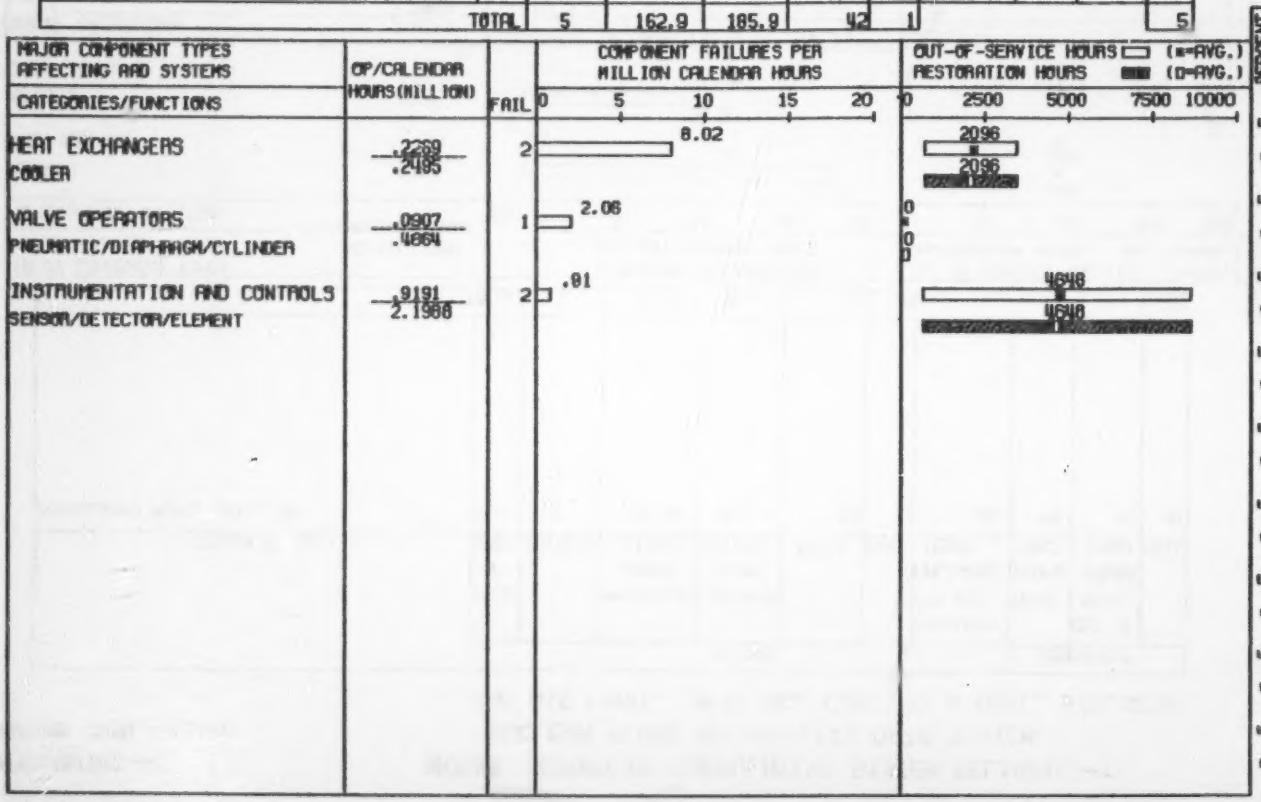
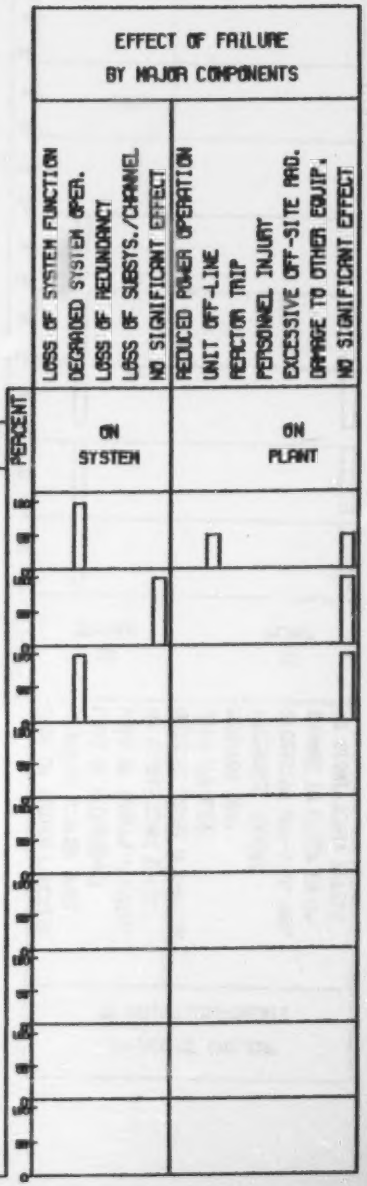
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAD AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
AIR CONDITIONING SYSTEM	WEST	5	162.9	185.9	42	1	5.38	2698	2698	5
TOTAL		5	162.9	185.9	42	1				5





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NUCLEAR PLANT RELIABILITY DATA SYSTEM
ARE AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AUXILLIARY BLDG. VENT. SYS.	WEST	5	91.8	212.3	12	0	.00	53	53	20
TOTAL		5	91.8	212.3	12	0				20

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING ARE SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 100 200 300 400)	PERCENT ON SYSTEM	PERCENT ON PLANT
RELAYS OVER 300 VDC	.0548 / .0571	1	17.51	184 ■ 184 □		
MOTORS LESS THAN 1 HP	.0274 / .1142	1	8.76	1 ■ 1 □		
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	2.1483 / 2.7983	15	5.36	34 ■ 34 ▩		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.3231 / 3.2557	2	.61	71 ■ 71 ▩		
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	3.6162 / 3.7699	1	.27	221 ■ 221 □		

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NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAF AIR COND., HEATING, COOLING & VENT. SYS. &CONT

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
ELECTRICAL EQUIP. VENT.	WEST	3	121.4	121.4	5	0	.00	0	0	0
	TOTAL	3	121.4	121.4	5	0				0

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NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAG AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SCREEN HOUSE VENT. SYS.	WEST	1	40.5	40.5	0	0	.00	0	0	0
	TOTAL	1	40.5	40.5	0	0				0

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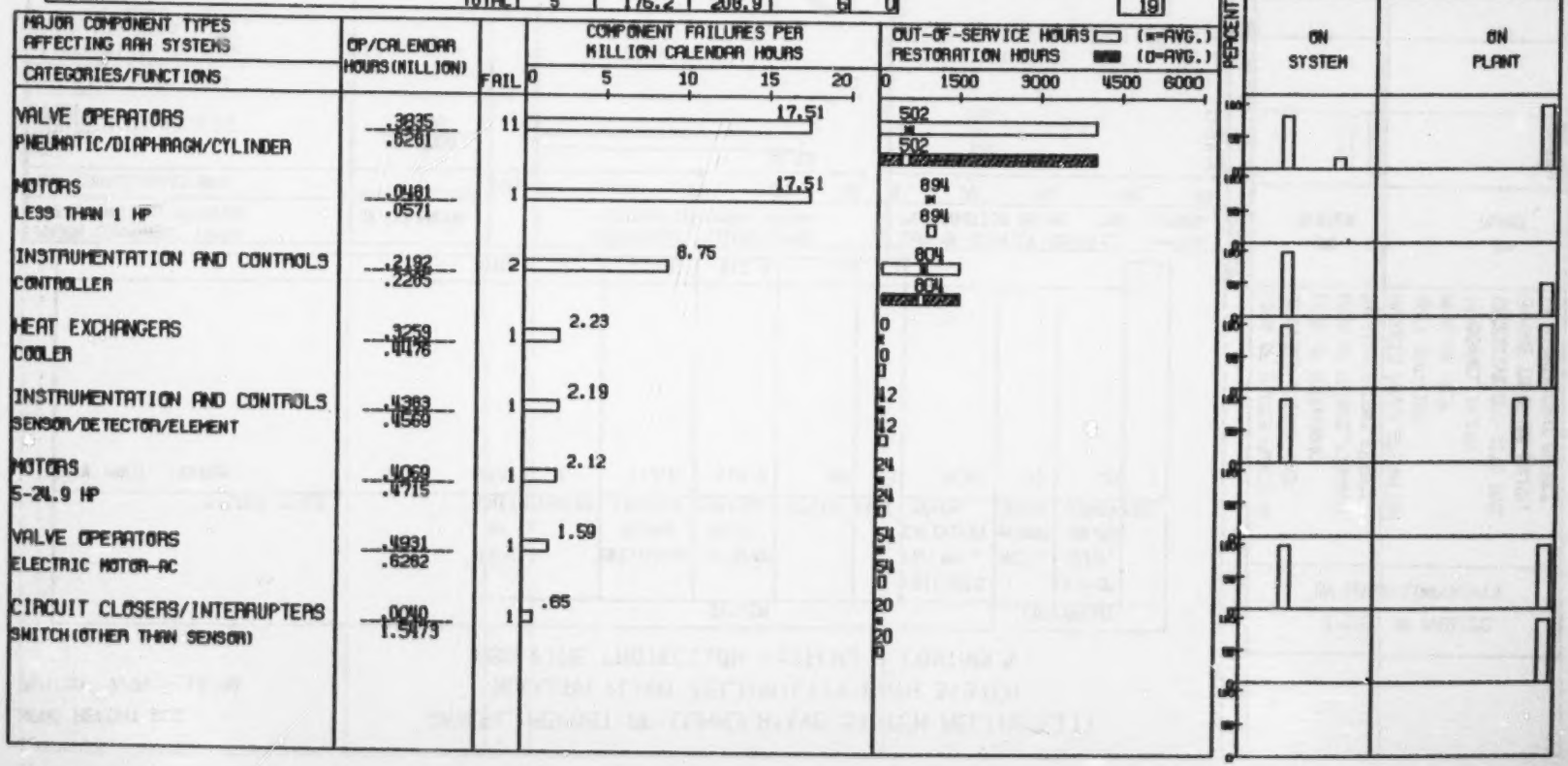
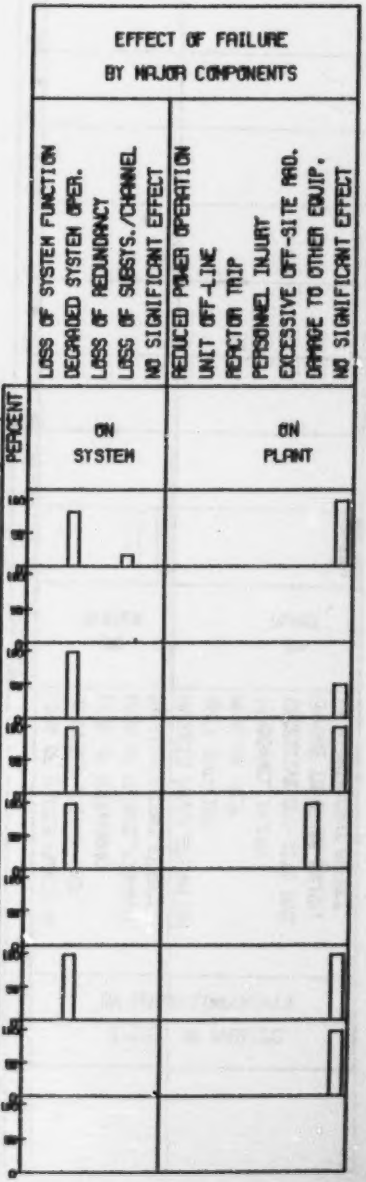
NUCLEAR PLANT RELIABILITY DATA SYSTEM
AAH AIR COND., HEATING, COOLING & VENT. SYS. &CONT

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
TURBINE BLDG. VENT. SYS.	WEST	5	176.2	208.9	6	0	.00	429	429	19
	TOTAL	5	176.2	208.9	6	0				19





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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ABD FIRE PROTECTION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FIRE PROT. SYSTEM	WEST	2	112.0	112.0	98	1	8.93	78	78	1
TOTAL		2	112.0	112.0	98	1				1

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCE POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING ABD SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ D=AVG.) (0 20 40 60 80)
VALVES	.0000	1	32.52	78 = 78
OTHER	.0308			

PERCENT

ON SYSTEM	ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ACC COMMUNICATION SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
COMMUNICATION SYSTEM	NEST	1	54.9	57.1	0	0	.00	108	108	3
TOTAL		1	54.9	57.1	0	0				3

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING ACC SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 100 200 300 400)
ANNUNCIATOR MODULES	.0548	3	17.51	108
AUDIO	.1714			108

PERCENT — ON SYSTEM | ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CBH COOLANT RECIRCULATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR COOLANT SYSTEM	WEST	21	892.2	1028.6	28098	11	10.69	463	463	340
TOTAL		21	892.2	1028.6	28098	11				340

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSTS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING CBH SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 2500 5000 7500 10000)	PERCENT ON SYSTEM	PERCENT ON PLANT
GENERATORS	.0504 / .1055	3	28.45	1 / 1		
OTHER						
ACCUMULATORS	.0570 / .0571	1	17.51	8 / 8		
SURGE TANK						
HEAT EXCHANGERS	2.4110 / 2.6006	42	15.00	348 / 347		
STEAM GENERATOR						
PUMPS	.2661 / .3977	4	10.06	226 / 226		
OTHER						
PUMPS	2.0401 / 2.7579	25	9.06	243 / 243		
OVER 50,000 GPM						
VALVE OPERATORS	.0274 / .1142	1	8.76	99 / 99		
HYDRAULIC						
PUMPS	.1301 / .2460	2	8.13	20 / 20		
UNDER 500 GPM						
VALVE OPERATORS	.0175 / .1559	1	6.41	22 / 22		
SOLENOID-AC						
ALL OTHERS	174.6877 / 218.5792	261	1.19	2 / 2		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
CFF RESIDUAL HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RESIDUAL HEAT REMOVAL SYS.	WEST	20	161.9	970.4	39546	0	.00	190	190	42
	TOTAL	20	161.9	970.4	39546	0				42

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING CFF SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 1000 2000 3000 4000)
PUMPS 2500-9999 GPM	.2060 .8881	6	6.76	331 331
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.0000 .2202	1	4.54	48 48 0
VALVES PRESSURE RELIEF	.0824 1.4027	5	3.47	10 10
VALVE OPERATORS ELECTRIC MOTOR-AC	.9749 7.2096	9	1.24	63 63
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.4619 2.4296	3	1.23	64 64
VALVES FLOW CONTROL	1.6549 3.3955	3	.88	1078 1078
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	8.6985 9.6260	5	.52	249 249
HEAT EXCHANGERS COOLER	.3388 1.9654	1	.51	24 24
ALL OTHERS	29.3379 56.3653	9	.16	6 6

PERCENT — ON SYSTEM | ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EB0 AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AUXILLIARY POWER SYS.	NEST	4	189.8	190.4	249	0	.00	159	159	11
TOTAL		4	189.8	190.4	249	0				11

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING EB0 SYSTEMS / CATEGORIES/FUNCTIONS	OF/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ a=AVG.) RESTORATION HOURS (■ d=AVG.) (0 200 400 600 800)
GENERATORS	.3105	7	22.48	224
INVERTER	.3114			224
CIRCUIT CLOSERS/INTERRUPTERS	11.1935	4	.29	46
CIRCUIT BREAKER	13.8670			46

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT: 0 5 10 15 20 25 30 35 40 45 50

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EBF AC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AC POWER SYS. AND CONTROLS.	WEST	16	746.9	776.5	29045	5	6.44	49	49	34
TOTAL		16	746.9	776.5	29045	5				34

MAJOR COMPONENT TYPES AFFECTING EBF SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 200 400 600 800)
NON-PEDIGREE COMPONENTS SEE APPENDIX A . R02(15)	.2192 / .2205	6	26.28	70 / 70
GENERATORS INVERTER	.7871 / .8585	6	6.99	130 / 130
RELAYS 100-199 VAC	.9279 / 1.0029	1	1.00	124 / 124 / 0
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	7121 / 42.0334	16	.38	11 / 11
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.0108 / 3.6091	1	.28	56 / 56 / 0
CIRCUIT CLOSERS/INTERRUPTERS STARTER	.1787 / 25.3701	3	.12	34 / 34
RELAYS 100-199 VDC	49.6584 / 68.1198	1	.02	10 / 10 / 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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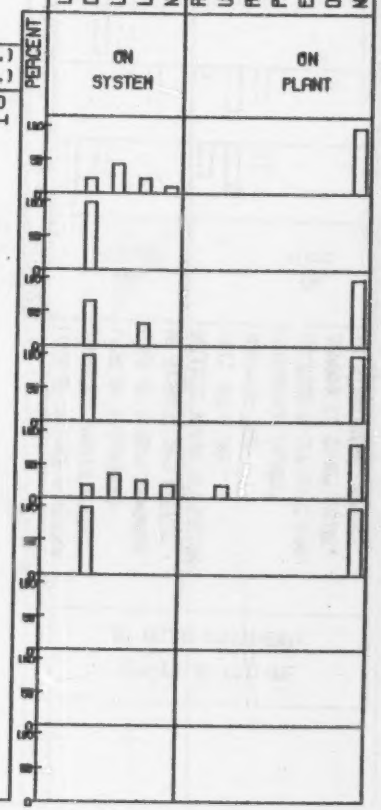
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
ECC DC ONSITE POWER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
D.C.POWER SYS.AND CONTROLS	WEST	15	609.6	701.6	30719	0	.00	667	667	28
	TOTAL	15	609.6	701.6	30719	0				28

MAJOR COMPONENT TYPES AFFECTING ECC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 1500 3000 4500 6000)
GENERATORS / INVERTER	.7088 / .7694	9	11.40	232 / 232
INSTRUMENTATION AND CONTROLS / CONTROLLER	.2740 / .2856	2	7.00	8 / 8
BATTERIES & CHARGERS / OTHER	.6532 / .6678	3	4.49	2613 / 2613
CIRCUIT CLOSERS/INTERRUPTERS / SWITCH(OTHER THAN SENSOR)	6.1625 / 6.1666	2	.32	742 / 742
BATTERIES & CHARGERS / STATION BATTERY	34.6290 / 35.1861	11	.31	657 / 657
CIRCUIT CLOSERS/INTERRUPTERS / CIRCUIT BREAKER	12.2913 / 25.5330	1	.04	19 / 19

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EDC ONSITE POWER SYS. & CONT. (COMPOSITE AC&DC)

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
ELECTRICAL SYSTEMS	WEST	12	550.6	629.4	14232	0	.00	153	153	45
TOTAL		12	550.6	629.4	14232	0				45

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING EDC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) RESTORATION HOURS (O=AVG.) (0 1000 2000 3000 4000)
GENERATORS INVERTER	1.0609 1.4172	27	19.05	100 100
GENERATORS OTHER	.1756 .2630	1	3.79	6 6
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.2573 .3817	1	2.62	6 6
HEATERS, ELECTRIC OTHER	.7298 .7317	1	1.37	8 8
HEATERS, ELECTRIC HEAT TRACING	4.8418 4.8539	6	1.24	41 41
TRANSFORMERS 0-200 VAC	1.3833 1.5980	1	.63	2568 2568
CIRCUIT CLOSERS/INTERRUPTERS SWITCH(OTHER THAN SENSOR)	5.1138 5.2573	1	.19	610 610
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	67.1386 77.9204	6	.08	121 121
ALL OTHERS	24.5170 39.2366	1	.03	2 2

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

ON SYSTEM | ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EEB EMERGENCY GENERATOR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EMERGENCY DIESEL AUX. SYS.	WEST	15	123.3	727.8	39173	2	2.75	531	531	96
TOTAL		15	123.3	727.8	39173	2				96

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING EEB SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 15 30 45 60)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 2000 4000 6000 8000)
GENERATORS	.0019	2	53.59	39
OTHER	.0374			33
RELAYS	.0102	4	35.40	95
100-199 VAC	.1130			95
ENGINES, INTERNAL COMBUSTION	.0069	35	22.81	620
DIESEL OR NO.2 FUEL OIL	1.5313			620
NON-PEDIGREE COMPONENTS	.0939	2	21.24	508
SEE APPENDIX A , R02(15)	.0942			508
GENERATORS	.0037	12	10.01	132
GENERATOR	1.1986			132
HEATERS, ELECTRIC	.1096	1	8.75	51
OTHER	.1102			51
VALVES	.0000	2	8.58	24
3-WAY SELECTOR	.2330			24
BLOWERS	.0147	8	7.80	86
COMPRESSOR	1.0260			86
ALL OTHERS	13.6556	30	.58	28
	52.1699			28

PERCENT — ON SYSTEM — ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
EFA EMERGENCY LIGHTING SYSTEMS & CONTROLS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
LIGHTING SYSTEM (EMERG.)	WEST	2	54.9	110.3	0	0	.00	0	0	0
	TOTAL	2	54.9	110.3	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FCD SPENT FUEL POOL COOLING & CLEANUP SYS. &CONT.

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
SPENT FUEL PIT COOL. SYS.	WEST	5	171.5	212.3	24	0	.00	0	0	0
TOTAL		5	171.5	212.3	24	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FCE SPENT FUEL POOL COOLING & CLEANUP SYS. &CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REFUELING WATER SYSTEM	WEST	4	92.0	195.3	414	0	.00	397	397	2
TOTAL		4	92.0	195.3	414	0				2

MAJOR COMPONENT TYPES AFFECTING FCE SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG. ▬=D-AVG.) (0 200 400 600 800)
INSTRUMENTATION AND CONTROLS	.0850 / .1304	1	7.22	792 ▬ 792
TRANSMITTER				
VALVES	.1407 / .5595	1	1.79	2 □ 2
SHUTOFF, ISOLATION, STOP				

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT: 100 90 80 70 60 50 40 30 20 10 0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FOF FUEL HANDLING SYSTEMS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
FUEL HANDLING & STOR. EQP.	WEST	1	.1	30.9	0	0	.00	0	0	0
TOTAL		1	.1	30.9	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
FDG FUEL HANDLING SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REFUELING EQUIPMENT	WEST	2	.5	103.0	10	0	.00	820	820	2
	TOTAL	2	.5	103.0	10	0				2

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT: 0 10 20 30 40 50 60 70 80 90 100

MAJOR COMPONENT TYPES AFFECTING FDG SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▪ =AVG.) (0 250 500 750 1000)
RELAYS 100-199 VAC	.0003 / .0571	1	17.51	820 ▭ 820 ▪ 0
MOTORS 1-4.99 HP	.0007 / .0282	1	1.59	820 ▭ 820 ▪ 0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HBC MAIN STEAM SUPPLY SYSTEM & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
STEAM SYSTEM	NEST	19	708.9	932.0	32034	4	4.29	515	515	220
TOTAL		19	708.9	932.0	32034	4				220

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING HBC SYSTEMS — CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 20 40 60 80)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ =AVG.) (0 2000 4000 6000 8000)	PERCENT ON SYSTEM	PERCENT ON PLANT
VALVES PRESSURE CONTROL	.2478 / .9669	22	59.97	469 / 469		
RELAYS 100-199 VAC	.0548 / .0571	1	17.51	25 / 25		
RELAYS 200-300 VAC	.0481 / .0571	1	17.51	2 / 2		
INSTRUMENTATION AND CONTROLS SWITCH	.0502 / .9022	10	11.08	63 / 63		
VALVE OPERATORS ELECTRIC MOTOR-OC	.0000 / .3778	3	7.94	595 / 595		
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	2.6812 / 5.6766	25	4.40	246 / 246		
VALVES SHUTOFF, ISOLATION, STOP	7.9785 / 13.0061	53	4.08	555 / 555		
VALVES FLOW CONTROL	.7073 / 1.9941	7	3.51	1048 / 1048		
ALL OTHERS	55.0503 / 79.0528	98	1.24	6 / 6		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HFD CIRCULATING WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CIRCULATING WATER SYSTEM	WEST	1	48.9	57.9	0	0	.00	659	659	2
	TOTAL	1	48.9	57.9	0	0				2

MAJOR COMPONENT TYPES AFFECTING HFD SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (O=AVG.) (0 500 1000 1500 2000)
INSTRUMENTATION AND CONTROLS INDICATOR	.7123 / .7425	2	2.69	659 / 659

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM: LOSS OF SYSTEM FUNCTION	ON SYSTEM: DEGRADED SYSTEM OPER.	ON SYSTEM: LOSS OF REDUNDANCY	ON SYSTEM: LOSS OF SUBSYS./CHANNEL	ON SYSTEM: NO SIGNIFICANT EFFECT	ON PLANT: REDUCED POWER OPERATION	ON PLANT: UNIT OFF-LINE	ON PLANT: REACTOR TRIP	ON PLANT: PERSONNEL INJURY	ON PLANT: EXCESSIVE OFF-SITE RAD.	ON PLANT: DAMAGE TO OTHER EQUIP.	ON PLANT: NO SIGNIFICANT EFFECT
0												

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HHC CONDENSATE AND FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
FEEDWATER SYSTEM (AUX).	WEST	19	226.8	931.9	21969	2	2.15	413	413	105
TOTAL		19	226.8	931.9	21969	2				105

MAJOR COMPONENT TYPES AFFECTING HHC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 25 50 75 100)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 2000 4000 6000 8000)
ENGINES, INTERNAL COMBUSTION DIESEL OR NO.2 FUEL OIL	.0004 / .0405	4	98.79	40 / 40
TURBINES 1000-5000 HP	.0004 / .0713	3	42.09	5 / 5
INSTRUMENTATION AND CONTROLS RECORDER	.0803 / .1582	4	25.29	1 / 1
PUMPS 500-2499 GPM	.0053 / .0684	9	22.04	20 / 20
VALVES PRESSURE CONTROL	.0000 / .0535	1	18.68	36 / 36
RELAYS OVER 300 VAC	.0062 / .0571	1	17.51	134 / 134
RELAYS 100-199 VDC	.0025 / .0571	1	17.51	16 / 16
PUMPS UNDER 500 GPM	.2051 / 1.2001	19	14.84	94 / 94
ALL OTHERS	24.0528 / 51.6229	63	1.22	10 / 10

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HHE CONDENSATE AND FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONDENSATE SYSTEMS	WEST	2	55.0	88.6	0	0	.00	224	224	14
TOTAL		2	55.0	88.6	0	0				14

MAJOR COMPONENT TYPES AFFECTING HHE SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 1000 2000 3000 4000) (=AVG.) (D=AVG.)
MOTORS 2000-2999 HP	.0356 / .0923	2	21.68	107 / 107
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	.1096 / .1142	2	17.51	2 / 2
VALVES PRESSURE RELIEF	.0000 / .1142	1	8.75	74 / 74
VALVES SHUTOFF,ISOLATION,STOP	.7671 / 1.2267	5	1.18	162 / 162
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	3.7006 / 4.3326	4	.92	507 / 507

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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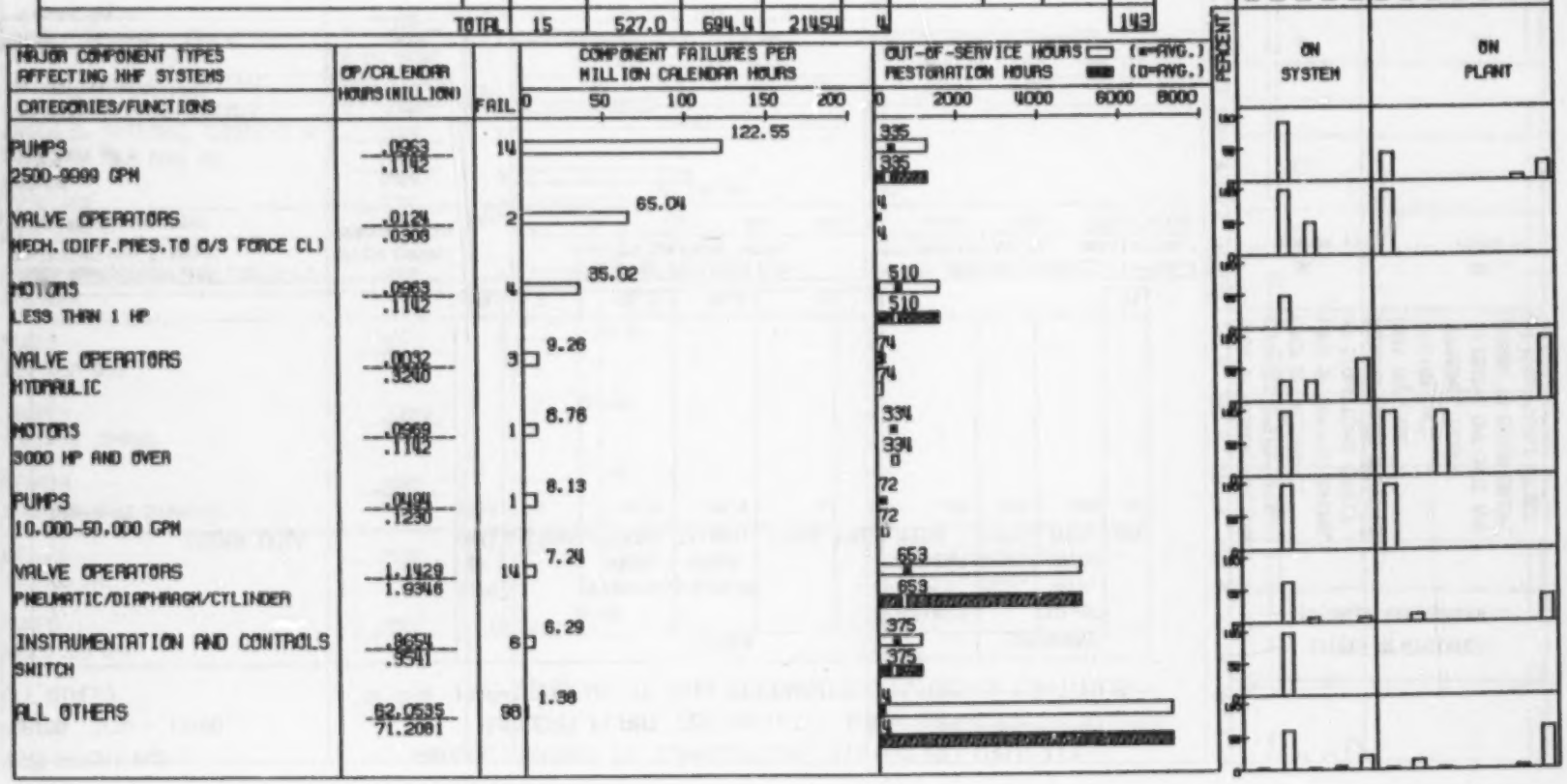
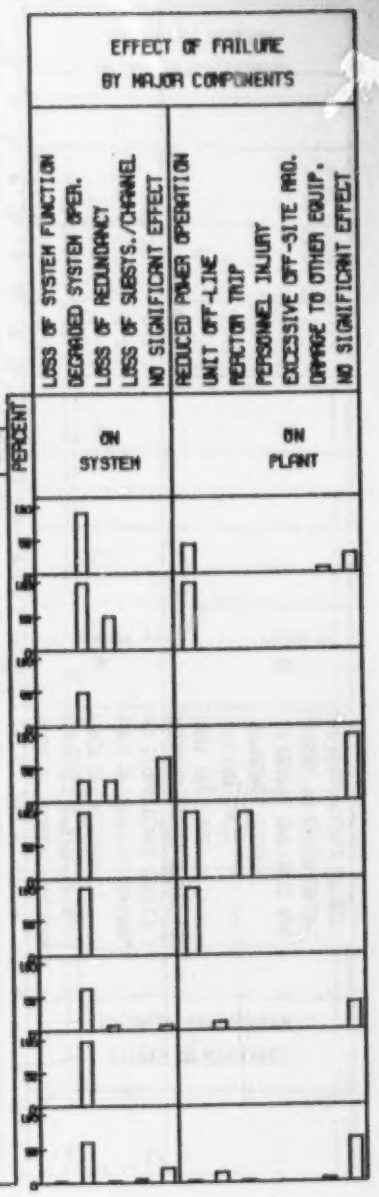
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HHF CONDENSATE AND FEEDWATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
STEAM GEN.FEEDWATER SYS.	WEST	15	527.0	694.4	21454	4	5.76	425	425	143
TOTAL		15	527.0	694.4	21454	4				143





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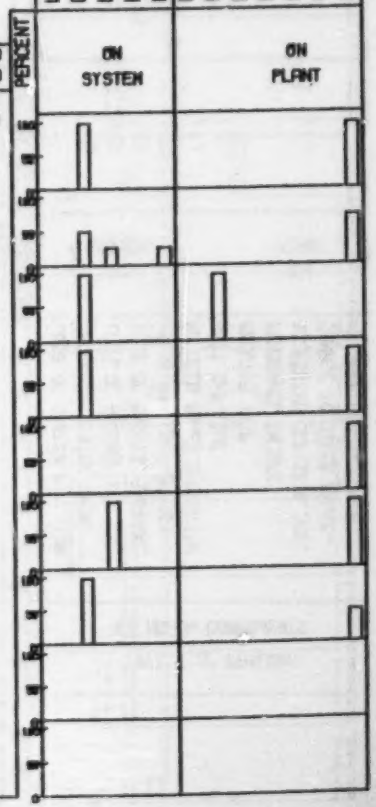
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
HIA STEAM GENERATOR BLOWDOWN SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
STEAM GENER.BLOWDOWN SYS.	WEST	13	476.0	614.1	14409	0	.00	490	490	14
	TOTAL	13	476.0	614.1	14409	0				14

MAJOR COMPONENT TYPES AFFECTING HIA SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 1000 2000 3000 4000)
VALVES / PRESSURE RELIEF	.0196 / .0308	1	32.52	80 * 80 □
VALVE OPERATORS / ELECTRIC MOTOR-AC	.2706 / .9440	4	4.24	384 * 384
NON-PEDIGREE COMPONENTS / SEE APPENDIX A . A02(15)	1.2196 / 1.2381	4	3.23	508 * 508 □
VALVES / FLOW CONTROL	.0043 / .4638	1	2.16	2598 * 2598 □
INSTRUMENTATION AND CONTROLS / SENSOR/DETECTOR/ELEMENT	.0549 / .5168	1	1.93	336 * 336 □
VALVE OPERATORS / PNEUMATIC/DIAPHRAGM/CYLINDER	.0857 / .5751	1	1.74	142 * 142 □
VALVES / SHUTOFF.ISOLATION.STOP	3.8102 / 5.2631	2	.38	69 * 69 □

EFFECT OF FAILURE BY MAJOR COMPONENTS



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IAD REACTOR TRIP SYSTEMS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
NUCLEAR PROTECTION INSTR.	WEST	23	958.0	1157.6	58076	0	.00	227	227	116
TOTAL		23	958.0	1157.6	58076	0				116

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING IAD SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ = AVG.) RESTORATION HOURS (■ = AVG.) (0 2000 4000 6000 8000)	PERCENT ON SYSTEM	PERCENT ON PLANT
CATEGORIES/FUNCTIONS						
INSTRUMENTATION AND CONTROLS RECORDER	5163 / .6725	4	5.85	22 / 22		
INSTRUMENTATION AND CONTROLS TRANSMITTER	.1038 / .1889	1	5.29	1 / 1		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	7.9844 / 14.3175	41	2.86	311 / 311		
INSTRUMENTATION AND CONTROLS OTHER	4.2241 / 9.1172	11	1.21	169 / 169		
INSTRUMENTATION AND CONTROLS INDICATOR	7.4261 / 13.5123	10	.74	4 / 4		
INSTRUMENTATION AND CONTROLS POWER SUPPLY	11.9338 / 14.4314	10	.69	899 / 899		
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	29.3140 / 36.6727	22	.60	83 / 83		
INSTRUMENTATION AND CONTROLS CONTROLLER	21.2207 / 26.3409	11	.42	55 / 55		
ALL OTHERS	34.2927 / 52.8945	6	.11	6 / 6		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IBG ENGINEERED SAFETY FEATURE INSTRUMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR PROTECTIVE LOGIC	WEST	17	791.7	833.4	45411	2	2.40	371	371	156
TOTAL		17	791.7	833.4	45411	2				156

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

ON SYSTEM | ON PLANT

MAJOR COMPONENT TYPES AFFECTING IBG SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□=AVG.) (▩=AVG.) (0 2000 4000 6000 8000)
GENERATORS	.1140 / .1142	3	26.26	2 / 2
INVERTER				
INSTRUMENTATION AND CONTROLS	1.3126 / 1.3510	5	3.70	16 / 16
INDICATOR				
RELAYS	.4557 / .4568	1	2.19	4 / 4 / 0
LESS THAN 50 VAC				
INSTRUMENTATION AND CONTROLS	14.0459 / 15.1879	30	1.97	673 / 673
SENSOR/DETECTOR/ELEMENT				
INSTRUMENTATION AND CONTROLS	31.5629 / 36.7854	37	1.01	229 / 229
CONTROLLER				
CIRCUIT CLOSERS/INTERRUPTERS	2.6993 / 3.2592	2	.61	10 / 10
CIRCUIT BREAKER				
INSTRUMENTATION AND CONTROLS	1.5003 / 1.7148	1	.58	3998 / 3998 / 0
TRANSMITTER				
INSTRUMENTATION AND CONTROLS	1.7116 / 1.8652	1	.54	4 / 4 / 4
SWITCH				
ALL OTHERS	289.1262 / 346.3725	76	.22	

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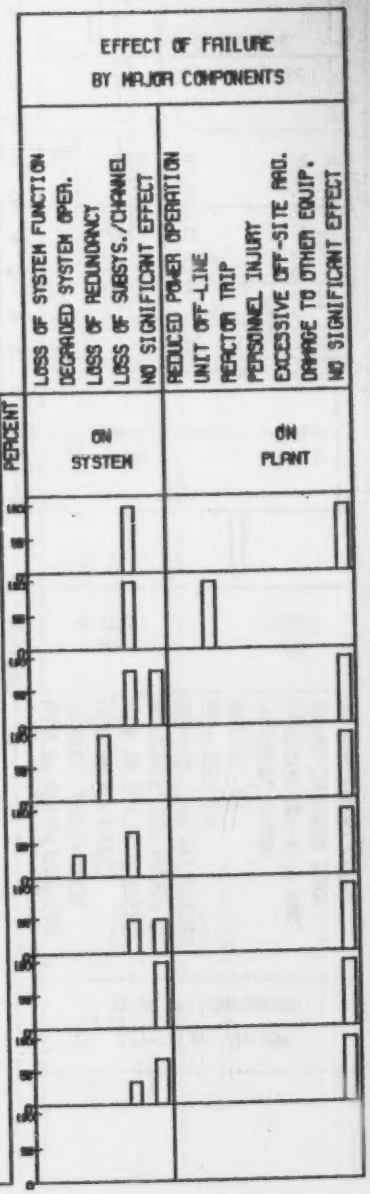
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEG OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
PROCESS PROTECTION INSTR.	WEST	4	207.0	217.8	21336	0	.00	174	174	18
	TOTAL	4	207.0	217.8	21336	0				18

MAJOR COMPONENT TYPES AFFECTING IEG SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 500 1000 1500 2000)
PUMPS UNDER 500 GPM	.0657 / .0659	1	15.18	432 / 432
INSTRUMENTATION AND CONTROLS OTHER	.0295 / .0677	1	14.76	1 / 1
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.7855 / 2.8710	5	1.74	272 / 272
INSTRUMENTATION AND CONTROLS TRANSMITTER	1.0271 / 1.2500	1	.80	5 / 5
INSTRUMENTATION AND CONTROLS INDICATOR	5.2274 / 5.3030	3	.57	316 / 316
INSTRUMENTATION AND CONTROLS POWER SUPPLY	9.3119 / 9.7634	2	.20	55 / 55
INSTRUMENTATION AND CONTROLS CONTROLLER	12.8585 / 13.3318	2	.15	76 / 76
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	28.1989 / 33.0739	3	.09	38 / 38



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
IEH OTHER INSTRUMENT SYSTEMS REQUIRED FOR SAFETY

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTROL BOARDS AND PANELS	WEST	2	83.6	85.7	0	0	.00	0	0	0
	TOTAL	2	83.6	85.7	0	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MAD LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
WASTE PROC. SYS (LIQUID)	WEST	13	582.0	625.9	26954	2	3.20	912	912	16
TOTAL		13	582.0	625.9	26954	2				16

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING MAD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (▪=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
HEAT EXCHANGERS EVAPORATOR	.0548 .0571	1	17.51	6 6		
HEATERS, ELECTRIC HEAT TRACING	.1096 .1142	2	17.51	144 144		
VALVES OTHER	.0056 .1116	1	8.96	8 8		
ANNUNCIATOR MODULES AUDIO/VISUAL	.1096 .1142	1	8.75	22 22		
PUMPS UNDER 500 GPM	.0657 .2284	2	8.76	804 804		
MOTORS 1-4.99 HP	.1096 .2285	1	4.38	194 194		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.5838 .7159	3	4.19	1812 1812		
INSTRUMENTATION AND CONTROLS CONTROLLER	1.0172 1.0614	3	2.83	2271 2271		
ALL OTHERS	6.5814 11.0137	2	.18	52 52		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MAE LIQUID RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
EQUIPMENT DRAIN SYS.	WEST	4	147.5	182.6	14220	0	.00	0	0	0
TOTAL		4	147.5	182.6	14220	0				0

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MBC GASEOUS RADIOACTIVE WASTE MANAGEMENT SYSTEMS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL.	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
WASTE PROC. SYS (GAS)	WEST	3	95.4	128.3	5	3	23.38	233	233	27
TOTAL		3	95.4	128.3	5	3				27

MAJOR COMPONENT TYPES AFFECTING MBC SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL.	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (▬ D=AVG.) (0 1500 3000 4500 6000)
BLOWERS COMPRESSOR	.1358 .2259	7	30.98	108 108
VALVES PRESSURE CONTROL	.1644 .1714	4	23.34	75 75
MOTORS 25-99.9 HP	.1096 .1758	1	5.69	320 320
VALVES SHUTOFF,ISOLATION,STOP	1.4067 2.2068	6	2.72	40 40
INSTRUMENTATION AND CONTROLS CONTROLLER	.2971 .3921	1	2.55	30 30
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.8191 .8474	2	2.36	2244 2244
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.5905 2.0136	4	1.99	83 83
INSTRUMENTATION AND CONTROLS INDICATOR	.5530 .5904	1	1.69	6 6
ALL OTHERS	3.4309 5.0247	1	.20	6 6

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT

ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
MCC PROCESS & EFFLUENT RAD. MONITORING SYS.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RADIATION MONIT. SYS.	WEST	7	337.4	348.4	22812	2	5.74	444	444	90
TOTAL		7	337.4	348.4	22812	2				90

MAJOR COMPONENT TYPES AFFECTING MCC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 50 100 150 200)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 2000 4000 6000 8000)
PUMPS UNDER 500 GPM	.1096 / .1142	12	105.06	90 / 90
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.1096 / .1142	5	43.78	2467 / 2467
INSTRUMENTATION AND CONTROLS RECORDER	.1096 / .1142	4	35.02	273 / 273
INSTRUMENTATION AND CONTROLS TRANSMITTER	.3294 / .3303	11	33.31	383 / 383
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.7130 / .7301	17	23.28	773 / 773
PUMPS 500-2499 GPM	.0548 / .0571	1	17.51	186 / 186
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.0229 / 2.0624	32	15.37	161 / 161
MOTORS 1-4.99 HP	.2102 / .2204	2	8.76	149 / 149
ALL OTHERS	2.0331 / 2.6616	6	2.25	69 / 69

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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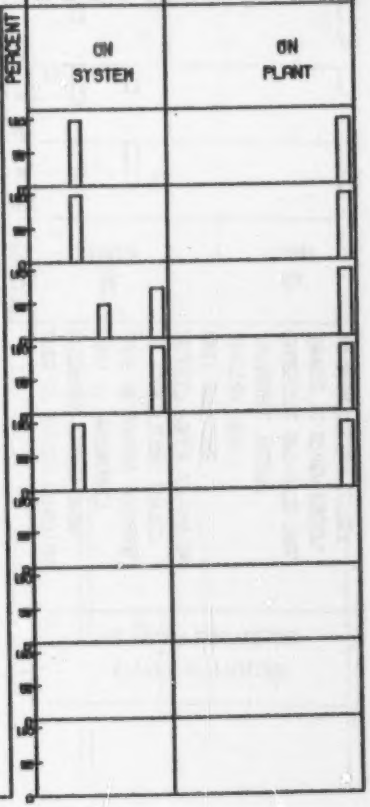
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PAD COMPRESSED AIR SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
INST. AND SERVICE AIR SYS.	WEST	8	421.4	423.3	14256	0	.00	168	168	11
TOTAL		8	421.4	423.3	14256	0				11

MAJOR COMPONENT TYPES AFFECTING PAD SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.) (0 500 1000 1500 2000)
RELAYS 100-199 VDC	.0181 / .0571	1	17.51	243 / 243
BLOWERS COMPRESSOR	.1111 / .3163	4	12.65	370 / 370
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.6370 / .7031	4	5.69	10 / 10
VALVES SHUTOFF,ISOLATION,STOP	.7439 / 2.1830	1	.46	58 / 58
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	2.9039 / 4.5691	1	.22	3 / 3

EFFECT OF FAILURE BY MAJOR COMPONENTS



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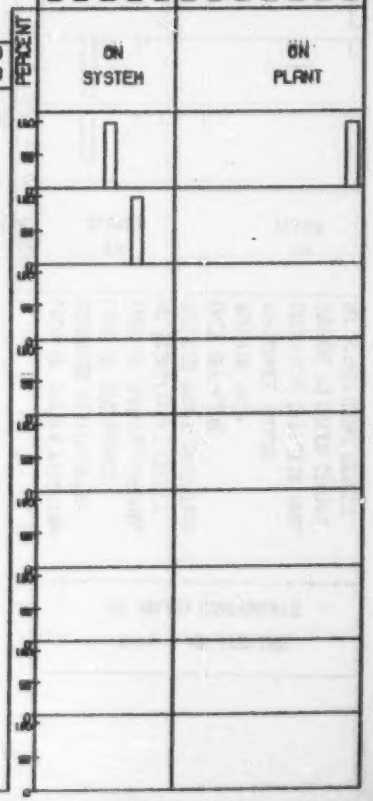
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PBC PROCESS SAMPLING SYSTEMS

SYSTEM TITLE	TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
SAMPLING SYSTEM	WEST	2	22.1	68.4	0	0	.00	466	468	3
	TOTAL	2	22.1	68.4	0	0				3

MAJOR COMPONENT TYPES AFFECTING PBC SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.) (0 200 400 600 800)
VALVES / SAMPLE	.0001 / .0306	1	32.52	2 * 2 □
INSTRUMENTATION AND CONTROLS / SENSOR/DETECTOR/ELEMENT	.4931 / .5141	2	3.89	698 * 698 □

EFFECT OF FAILURE BY MAJOR COMPONENTS



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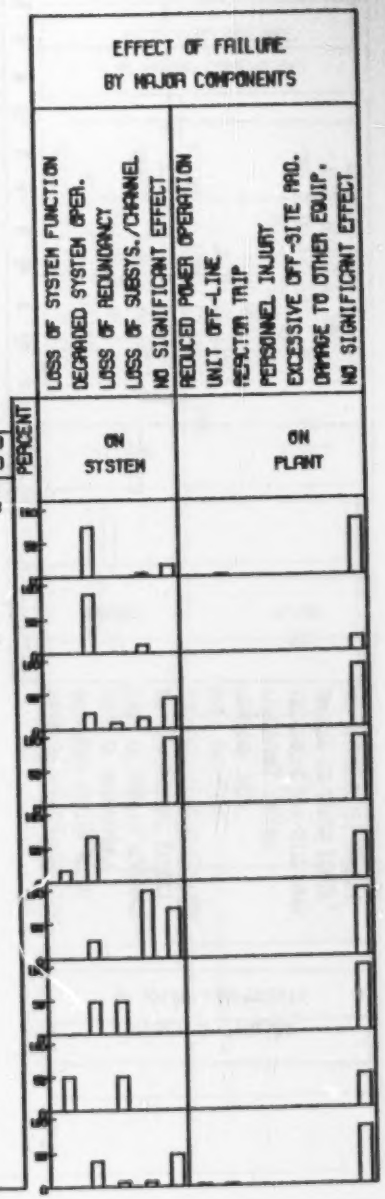
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCG CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CHEMICAL & VOL. CONT. SYS.	NEST	20	857.5	971.7	37668	5	5.15	432	432	565
	TOTAL	20	857.5	971.7	37668	5				565

MAJOR COMPONENT TYPES AFFECTING PCG SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 50 100 150 200)	OUT-OF-SERVICE HOURS (■=AVG.) / RESTORATION HOURS (■=AVG.) (0 2500 5000 7500 10000)
MECHANICAL FUNCTION UNITS PUMP CONTROL	.0542 / .1713	34	198.50	230 / 230
HEAT EXCHANGERS EVAPORATOR	.0027 / .0571	9	157.56	38 / 38
PUMPS UNDER 500 GPM	2.1031 / 4.4584	253	56.75	284 / 284
PUMPS 2500-9999 GPM	.0196 / .0308	1	32.48	26 / 26
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.2036 / .2329	6	25.76	508 / 508
MECHANICAL FUNCTION UNITS SPEED CHANGER	.1872 / .5558	4	7.20	22 / 22
MOTORS 500-999 HP	.2450 / .5962	4	6.71	17 / 17
MECHANICAL FUNCTION UNITS ALIGNMENT DEVICE (COUPLING)	.3007 / .3911	2	5.11	91 / 91
ALL OTHERS	175.2873 / 243.7527	252	1.03	3 / 3



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PCH CHEMICAL, VOLUME CONTROL, & LIQUID POISON SYS

SYSTEM TITLE	SYSTEM							COMPONENT		
	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
BORON RECYCLE SYSTEM	WEST	1	11.4	47.9	0	0	.00	264	264	2
TOTAL		1	11.4	47.9	0	0				2

MAJOR COMPONENT TYPES AFFECTING PCH SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS RESTORATION HOURS
CATEGORIES/FUNCTIONS			0 5 10 15 20	0 100 200 300 400 (x=AVG.) (□=AVG.)
PUMPS UNDER 500 GPM	.0919 / .1105	2	18.10	264 / 264

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION		
DEGRADED SYSTEM OPER.		
LOSS OF REDUNDANCY		
LOSS OF SUBSYS./CHANNEL		
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT 0 10 20 30 40 50 60 70 80 90 100

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
PEB OTHER AUXILIARY PROCESS SYSTEMS & THEIR CON.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
AUXILIARY STEAM SYS.	WEST	2	17.5	71.2	55	0	.00	4	4	3
TOTAL		2	17.5	71.2	55	0				3

MAJOR COMPONENT TYPES AFFECTING PEB SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 5 10 15 20)
VALVE OPERATORS ELECTRIC MOTOR-OC	.0004 / .0405	1	24.68	
MOTORS 1-4.99 HP	.0008 / .0810	1	12.34	
VALVES SHUTOFF, ISOLATION, STOP	.0281 / .0810	1	12.34	

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	LOSS OF SYSTEM FUNCTION DEGRADED SYSTEM OPER. LOSS OF REDUNDANCY LOSS OF SUBSYS./CHANNEL NO SIGNIFICANT EFFECT — ON SYSTEM	REDUCED POWER OPERATION UNIT OFF-LINE REACTOR TRIP PERSONNEL INJURY EXCESSIVE OFF-SITE RAD. DAMAGE TO OTHER EQUIP. NO SIGNIFICANT EFFECT — ON PLANT
100		
90		
80		
70		
60		
50		
40		
30		
20		
10		
0		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RAD REACTOR VESSEL INTERNALS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
IN-CORE EQUIPMENT	WEST	4	195.8	215.5	0	0	.00	1000	1000	27
TOTAL		4	195.8	215.5	0	0				27

EFFECT OF FAILURE BY MAJOR COMPONENTS

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING RAD SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 25 50 75 100)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 500 1000 1500 2000) (■=AVG. ■=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
INSTRUMENTATION AND CONTROLS INDICATOR	.0548 / .0571	5	87.53	484 / 484		
INSTRUMENTATION AND CONTROLS SENSOR/DETECTOR/ELEMENT	.4665 / .5139	9	17.51	576 / 576		
INSTRUMENTATION AND CONTROLS COMPUTATION MODULE	.0548 / .0571	1	17.51	489 / 499		
NON-PEDIGREE COMPONENTS SEE APPENDIX A , R02(15)	2.0733 / 2.0911	11	4.52	1734 / 1734		
INSTRUMENTATION AND CONTROLS POWER SUPPLY	.2192 / .2284	1	4.38	30 / 30		

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RBD REACTIVITY CONTROL SYSTEMS

	SYSTEM							COMPONENT		
SYSTEM TITLE	TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
RBD CLUSTER CONTROL SYS.	WEST	20	918.6	1021.2	54019	6	5.86	316	316	104
	TOTAL	20	918.6	1021.2	54019	6				104

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSYS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING RBD SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (□=AVG.) RESTORATION HOURS (■=AVG.)
CATEGORIES/FUNCTIONS			0 10 20 30 40	0 1000 2000 3000 4000
CONTROL ROD DRIVE MECHANISMS	.0608	2	32.80	270
OTHER	.0610			270
BLOWERS	.0383	1	17.52	648
FAN	.0571			648
RELAYS	.1096	3	17.51	15
100-199 VAC	.1713			15
NON-PEDIGREE COMPONENTS	4.3992	40	6.72	507
SEE APPENDIX A , A02(15)	5.9542			507
GENERATORS	.1363	1	6.56	168
ALTERNATOR	.1524			168
MOTORS	.4811	3	5.21	505
100-499 HP	.5781			505
MECHANICAL FUNCTION UNITS	.5128	2	3.89	20
SPEED CHANGER	.5141			20
MOTORS	.5126	2	3.89	17
LESS THAN 1 HP	.5139			17
ALL OTHERS	68.3009	50	.61	4
	82.0167			4

PERCENT

ON SYSTEM

ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
RCD REACTOR CORE

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
REACTOR CORE	WEST	15	667.7	751.2	8969	0	.00	224	224	6
TOTAL		15	667.7	751.2	8969	0				6

MAJOR COMPONENT TYPES AFFECTING RCD SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ x=AVG.) RESTORATION HOURS (▪ o=AVG.) (0 500 1000 1500 2000)
CONTROL RODS REGULATING	2.4167 / 2.4849	5	2.01	26 x 26 o
CONTROL RODS SHUTDOWN	5.1850 / 5.2493	1	.19	24 x 24 o

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

ON SYSTEM	ON PLANT

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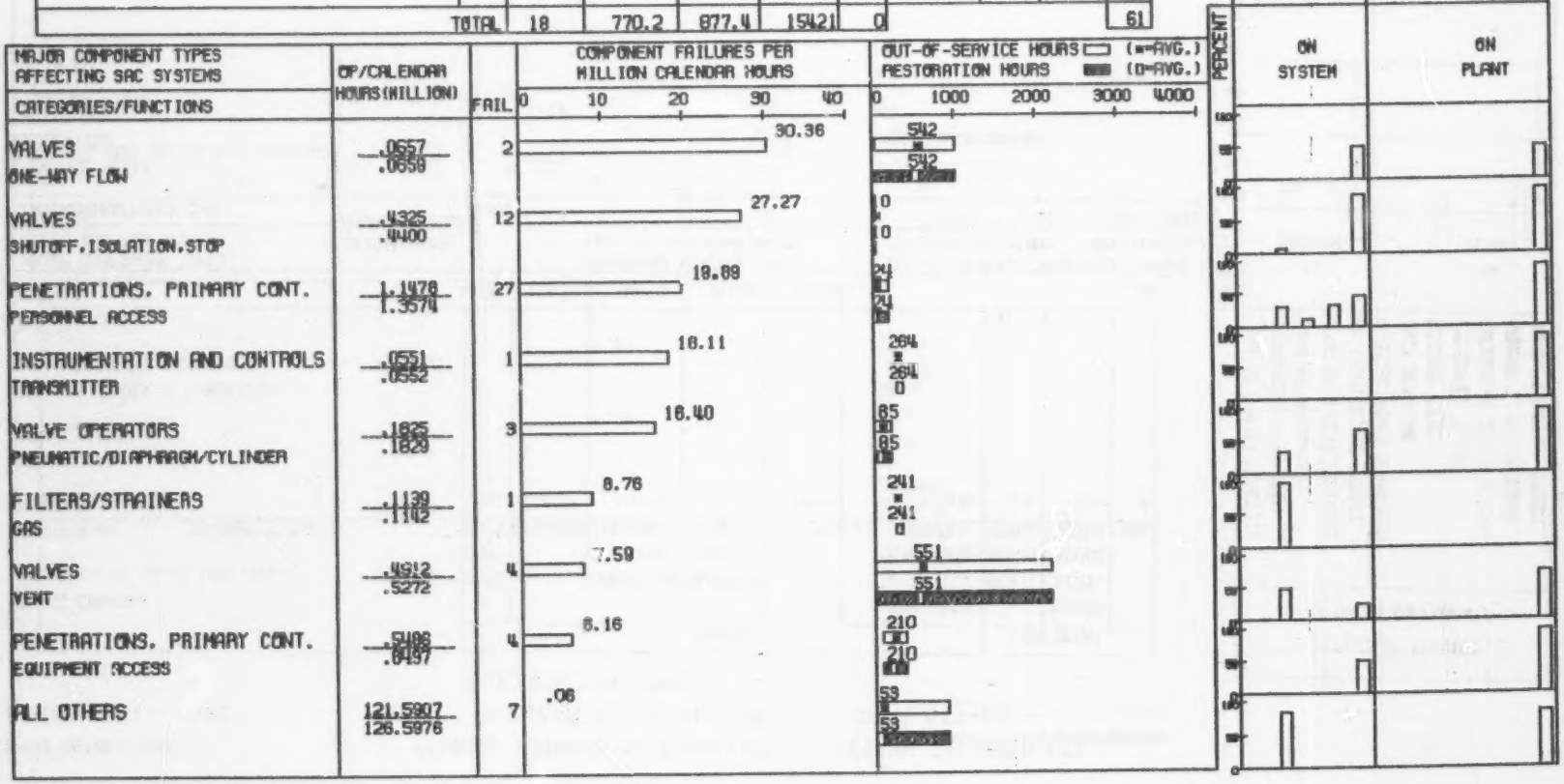
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SAC REACTOR CONTAINMENT SYSTEMS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTAINMENT SYSTEM.	WEST	18	770.2	877.4	15421	0	.00	135	135	61
TOTAL		18	770.2	877.4	15421	0				61



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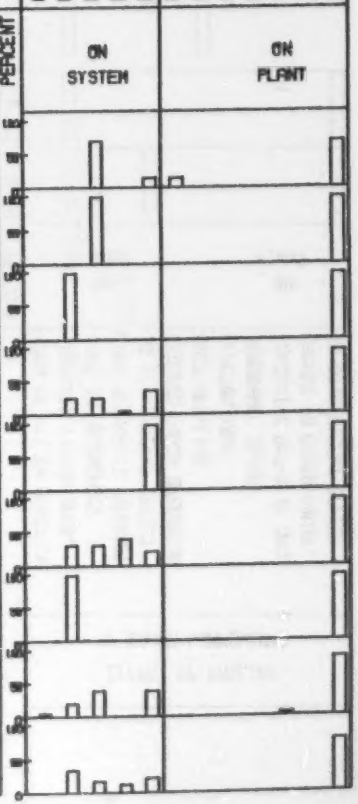
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SBD CONTAINMENT HEAT REMOVAL SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
CONTAINMENT VENT. SYSTEM	WEST	18	736.9	885.8	18058	1	1.13	303	309	114
TOTAL		18	736.9	885.8	18058	1				114

MAJOR COMPONENT TYPES AFFECTING SBD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭=AVG.) RESTORATION HOURS (▬=AVG.) (0 2000 4000 6000 8000)
CIRCUIT CLOSERS/INTERRUPTERS SWITCHGEAR	.0548 .2855	7	24.52	214 214
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	.0570 .0571	1	17.51	26 26
VALVE OPERATORS ELECTRIC MOTOR-OC	.0826 .1499	1	6.70	85 85
VALVES SHUTOFF,ISOLATION,STOP	6.3463 8.5842	34	3.97	76 76
VALVES ONE-WAY FLOW	.3242 .5089	2	3.93	209 209
HEAT EXCHANGERS COOLER	1.7868 2.5774	10	3.88	66 66
INSTRUMENTATION AND CONTROLS TRANSMITTER	.7190 .7732	3	3.88	18 18
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	2.3178 5.3361	21	3.54	135 135
ALL OTHERS	21.2019 38.7057	35	.90	21 21

EFFECT OF FAILURE BY MAJOR COMPONENTS



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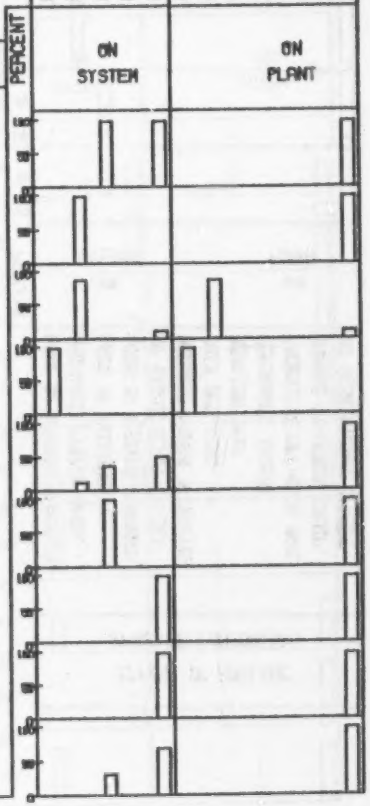
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCE CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTAINMENT SPRAY SYSTEM	WEST	20	92.6	946.7	22749	0	.00	225	225	33
TOTAL		20	92.6	946.7	22749	0				33

MAJOR COMPONENT TYPES AFFECTING SCE SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS 0 5 10 15 20	OUT-OF-SERVICE HOURS ▭ (=AVG.) ▬ (D-AVG.) RESTORATION HOURS 0 500 1000 1500 2000
ENGINES, INTERNAL COMBUSTION DIESEL OR NO.2 FUEL OIL	.0574 / .1692	1	5.91	59 = 58 D 0
VALVE OPERATORS OTHER	.0000 / .2155	1	4.64	200 = 200 D 0
NON-PEDIGREE COMPONENTS SEE APPENDIX A , R02(15)	3.1399 / 5.0392	9	2.62	452 = 452 D
VALVES OTHER	.2851 / .4819	1	2.08	48 = 48 D 0
VALVE OPERATORS ELECTRIC MOTOR-AC	.9634 / 4.0838	6	1.96	76 = 76 D
CIRCUIT CLOSERS/INTERRUPTERS CIRCUIT BREAKER	.2353 / .6508	1	1.54	8 = 8 D 0
CIRCUIT CLOSERS/INTERRUPTERS STARTER	.0000 / .6605	1	1.51	48 = 48 D 0
PUMPS 2500-9999 GPM	.0018 / 1.1568	1	.86	1276 = 1276 D 0
ALL OTHERS	20.9992 / 45.6096	10	.22	11 = 11 D

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT



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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCF CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
ANNULUS VENT SYSTEM	WEST	2	.3	85.0	43	0	.00	670	670	5
TOTAL		2	.3	85.0	43	0				5

MAJOR COMPONENT TYPES AFFECTING SCF SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 1000 2000 3000 4000)
PUMPS UNDER 500 GPM	.1096 / .1142	1	6.76	3 = 3 0
INSTRUMENTATION AND CONTROLS CONTROLLER	.1096 / .4569	2	4.38	7 = 7 0
INSTRUMENTATION AND CONTROLS INDICATOR	.1643 / .0482	1	2.23	61 = 61 0
VALVE OPERATORS ELECTRIC MOTOR-AC	.0007 / .7936	1	1.26	3254 = 3254 0

EFFECT OF FAILURE BY MAJOR COMPONENTS

	ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	50	
DEGRADED SYSTEM OPER.	50	50
LOSS OF REDUNDANCY	50	
LOSS OF SUBSYS./CHANNEL	50	50
NO SIGNIFICANT EFFECT		
REDUCED POWER OPERATION		
UNIT OFF-LINE		
REACTOR TRIP		
PERSONNEL INJURY		
EXCESSIVE OFF-SITE RAD.		
DAMAGE TO OTHER EQUIP.		
NO SIGNIFICANT EFFECT		

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SCG CONTAIN. AIR PURIF. & CLEANUP SYS. & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONTAINMENT AIR RET. SYS.	WEST	4	197.4	199.5	10869	0	.00	682	682	5
TOTAL		4	197.4	199.5	10869	0				5

MAJOR COMPONENT TYPES AFFECTING SCG SYSTEMS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS (□ =AVG.) RESTORATION HOURS (■ =AVG.) (0 500 1000 1500 2000)
CATEGORIES/FUNCTIONS				
HEAT EXCHANGERS	.5991	5	8.18	682
COOLER	.6114			682

EFFECT OF FAILURE BY MAJOR COMPONENTS

PERCENT	ON SYSTEM	ON PLANT
100		
90		
80		
70		
60		
50		
40		
30		
20		
10		
0		

- LOSS OF SYSTEM FUNCTION
- DEGRADED SYSTEM OPER.
- LOSS OF REDUNDANCY
- LOSS OF SUBSYS./CHANNEL
- NO SIGNIFICANT EFFECT
- REDUCED POWER OPERATION
- UNIT OFF-LINE
- REACTOR TRIP
- PERSONNEL INJURY
- EXCESSIVE OFF-SITE RAD.
- DAMAGE TO OTHER EQUIP.
- NO SIGNIFICANT EFFECT

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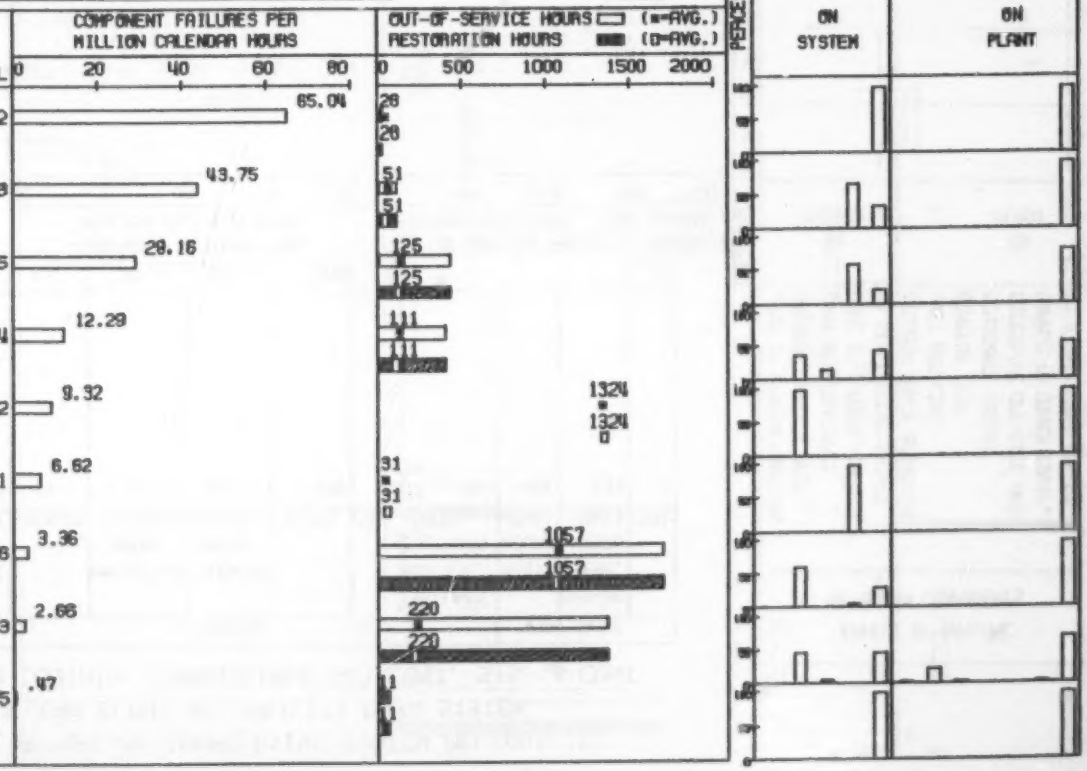
ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SDB CONTAINMENT ISOLATION SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEM: SYSTEMS	SYSTEM: OPERATING HOURS (X1000)	SYSTEM: CALENDAR HOURS (X1000)	SYSTEM: TESTS	SYSTEM: FAIL	SYSTEM: FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	COMPONENT: OUT-OF SERV. HOURS (AVG)	COMPONENT: FAIL
CONTAINMENT ISOLATION SYS.	WEST	11	424.3	562.9	14689	0	.00	364	364	81
	TOTAL	11	424.3	562.9	14689	0				81

MAJOR COMPONENT TYPES AFFECTING SDB SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS(MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (*=AVG.) / RESTORATION HOURS (□=AVG.)
PENETRATIONS, PRIMARY CONT. / PERSONNEL ACCESS	.0262 / .0308	2	65.04	28 / 28
BLOWERS / GAS CIRCULATOR	.0663 / .0686	3	43.75	51 / 51
INSTRUMENTATION AND CONTROLS / SENSOR/DETECTOR/ELEMENT	.1667 / .1714	5	28.16	125 / 125
VALVES / ONE-WAY FLOW	.5813 / 1.1391	14	12.29	111 / 111
VALVES / PRESSURE RELIEF	.1163 / .2146	2	9.32	1324 / 1324
MOTORS / 1-4.99 HP	.0425 / .1511	1	6.62	31 / 31
VALVE OPERATORS / PNEUMATIC/DIAPHRAGM/CYLINDER	2.8182 / 4.7619	16	3.36	1057 / 1057
VALVES / SHUTOFF, ISOLATION, STOP	8.7418 / 12.4086	33	2.66	220 / 220
ALL OTHERS	4.8955 / 10.6766	5	.47	11 / 11



NPRD REPORT RC2
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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SED CONTAIN. COMBUSTIBLE GAS CONT. SYS. & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
CONT.COMB.GAS CONTROL SYS.	WEST	13	91.3	575.7	375	0	.00	139	139	5
TOTAL		13	91.3	575.7	375	0				5

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING SED SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 5 10 15 20)	OUT-OF-SERVICE HOURS RESTORATION HOURS (□ =AVG. ■ =AVG.) (0 100 200 300 400)
VALVES ONE-WAY FLOW	.2096 .3344	1	2.99	94 94
VALVE OPERATORS ELECTRIC MOTOR-AC	.2232 1.0741	2	1.86	36 36
VALVES SHUTOFF.ISOLATION.STOP	1.7763 2.6044	2	.77	264 264

LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT

PERCENT (0 10 20 30 40 50 60 70 80 90 100)

ON SYSTEM

ON PLANT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
SFH EMERGENCY CORE COOLING SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
SAFETY INJECTION SYSTEM	NEST	20	217.3	972.1	28289	2	2.06	615	615	160
TOTAL		20	217.3	972.1	28289	2				160

MAJOR COMPONENT TYPES AFFECTING SFH SYSTEMS / CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (▪=AVG.) (0 2000 4000 6000 8000)
ANNUNCIATOR MODULES AUDIO/VISUAL	.0378 / .0463	1	20.70	24 / 24
PUMPS 2500-9999 GPM	.0090 / .3603	9	8.33	46 / 46
PUMPS 500-2499 GPM	.0099 / 1.3970	6	4.30	148 / 148
PUMPS UNDER 500 GPM	.3205 / 1.0972	4	3.86	216 / 216
HEATERS, ELECTRIC OTHER	.2095 / .2974	1	3.38	48 / 48
INSTRUMENTATION AND CONTROLS TRANSMITTER	6.8385 / 7.9663	15	1.88	389 / 389
VALVE OPERATORS ELECTRIC MOTOR-AC	5.7676 / 23.9625	41	1.71	389 / 389
ACCUMULATORS HOLD UP STORAGE TANK	.0052 / .0842	1	1.48	643 / 643
ALL OTHERS	81.9590 / 151.2519	88	.58	10 / 10

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

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ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WAD STATION SERVICE WATER SYSTEMS & CONTROLS

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
SERVICE WATER SYSTEM	WEST	15	612.0	664.0	21752	0	.00	499	499	67
TOTAL		15	612.0	664.0	21752	0				67

EFFECT OF FAILURE BY MAJOR COMPONENTS

MAJOR COMPONENT TYPES AFFECTING WAD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS	OUT-OF-SERVICE HOURS (=AVG.) RESTORATION HOURS (=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
VALVE OPERATORS SOLENOID-DC	.0262 / .0308	1	32.52	80 / 80		
PUMPS 2500-9999 GPM	.0135 / .0282	11	13.28	722 / 722		
MOTORS 1000-1999 HP	.0136 / .0158	2	13.01	285 / 295		
FILTERS/STRAINERS LIQUID	.0735 / 1.0115	9	8.90	277 / 277		
MOTORS 100-499 HP	.0838 / .3905	1	2.56	190 / 190		
VALVE OPERATORS PNEUMATIC/DIAPHRAGM/CYLINDER	.5358 / 2.5431	5	1.97	510 / 510		
VALVES FLOW CONTROL	1.3004 / 6.7593	15	1.71	292 / 292		
VALVE OPERATORS ELECTRIC MOTOR-AC	1.1180 / 3.6047	6	1.63	122 / 122		
ALL OTHERS	29.8004 / 56.1717	17	.30	50 / 50		

EFFECT OF FAILURE BY MAJOR COMPONENTS

ON SYSTEM	ON PLANT
LOSS OF SYSTEM FUNCTION	REDUCED POWER OPERATION
DEGRADED SYSTEM OPER.	UNIT OFF-LINE
LOSS OF REDUNDANCY	REACTOR TRIP
LOSS OF SUBSYS./CHANNEL	PERSONNEL INJURY
NO SIGNIFICANT EFFECT	EXCESSIVE OFF-SITE RAD.
	DAMAGE TO OTHER EQUIP.
	NO SIGNIFICANT EFFECT

NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WBD COOLING SYSTEMS FOR REACTOR AUXILIARIES & CON

SYSTEM TITLE	SYSTEM TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT REST. HOURS (AVG)	COMPONENT OUT-OF SERV. HOURS (AVG)	COMPONENT FAIL
COMPONENT COOLING SYSTEMS	WEST	18	788.2	844.9	14913	0	.00	737	737	37
TOTAL		18	788.2	844.9	14913	0				37

MAJOR COMPONENT TYPES AFFECTING WBD SYSTEMS CATEGORIES/FUNCTIONS	OP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS (▭ =AVG.) RESTORATION HOURS (■ =AVG.) (0 2000 4000 6000 8000)
PUMPS 2500-9999 GPM	.2098 / .4650	11	22.84	1582 / 1562
HEAT EXCHANGERS COOLER	.1995 / .3361	4	11.83	1059 / 1059
NON-PEDIGREE COMPONENTS SEE APPENDIX A . A02(15)	1.1332 / 1.2169	6	4.93	508 / 508
PUMPS UNDER 500 GPM	.1454 / .3270	1	3.06	7 / 7
MOTORS LESS THAN 1 HP	.1590 / .9810	1	1.02	7 / 7
VALVES OTHER	.1228 / 5.5797	3	.54	874 / 874
VALVE OPERATORS ELECTRIC MOTOR-AC	1.2819 / 4.9895	4	.80	1 / 1
INSTRUMENTATION AND CONTROLS OTHER	.0000 / 1.2930	1	.77	24 / 24
ALL OTHERS	38.5706 / 61.1176	6	.10	4 / 4

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION	DEGRADED SYSTEM OPER.	LOSS OF REDUNDANCY	LOSS OF SUBSYS./CHANNEL	NO SIGNIFICANT EFFECT	REDUCED POWER OPERATION	UNIT OFF-LINE	REACTOR TRIP	PERSONNEL INJURY	EXCESSIVE OFF-SITE RAD.	DAMAGE TO OTHER EQUIP.	NO SIGNIFICANT EFFECT
ON SYSTEM					ON PLANT						

PERCENT

NPRD REPORT A02
PERIOD 7/74 - 12/80

ANNUAL REPORT OF CUMMULATIVE SYSTEM RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM
WCC DEMINERALIZED WATER MAKE-UP SYSTEMS & CONT.

SYSTEM TITLE	SYSTEM: TYPE OF UNIT	SYSTEMS	OPERATING HOURS (X1000)	CALENDAR HOURS (X1000)	TESTS	FAIL	FAILURES PER MIL. CALENDAR HOURS	COMPONENT: REST. HOURS (AVG)	OUT-OF SERV. HOURS (AVG)	FAIL
MAKEUP WATER SYS.	WEST	3	144.7	171.8	14232	0	.00	481	481	55
TOTAL		3	144.7	171.8	14232	0				55

EFFECT OF FAILURE BY MAJOR COMPONENTS

LOSS OF SYSTEM FUNCTION
DEGRADED SYSTEM OPER.
LOSS OF REDUNDANCY
LOSS OF SUBSTS./CHANNEL
NO SIGNIFICANT EFFECT
REDUCED POWER OPERATION
UNIT OFF-LINE
REACTOR TRIP
PERSONNEL INJURY
EXCESSIVE OFF-SITE RAD.
DAMAGE TO OTHER EQUIP.
NO SIGNIFICANT EFFECT

MAJOR COMPONENT TYPES AFFECTING MCC SYSTEMS / CATEGORIES/FUNCTIONS	CP/CALENDAR HOURS (MILLION)	FAIL	COMPONENT FAILURES PER MILLION CALENDAR HOURS (0 10 20 30 40)	OUT-OF-SERVICE HOURS RESTORATION HOURS (0 1500 3000 4500 6000) (*=AVG.) (D=AVG.)	PERCENT ON SYSTEM	PERCENT ON PLANT
MECHANICAL FUNCTION UNITS SPEED CHANGER	.0548 / .0571	2	35.01	2343 / 2343		
PUMPS UNDER 500 GPM	.0459 / 1.7139	34	19.84	311 / 311		
VALVES OTHER	.0548 / .1142	2	17.51	2820 / 2920		
PUMPS 500-2499 GPM	.0548 / .1142	1	8.76	12 / 12		
MOTORS 5-24.9 HP	.3402 / .8553	7	8.18	150 / 150		
INSTRUMENTATION AND CONTROLS TRANSMITTER	.1548 / .1714	1	5.84	44 / 44		
MOTORS LESS THAN 1 HP	.8149 / 1.5992	6	3.75	525 / 525		
INSTRUMENTATION AND CONTROLS CONTROLLER	.8767 / 1.0280	1	.97	2 / 2		
ALL OTHERS	9.3805 / 18.5067	1	.05	52 / 52		

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
(Report A03)

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY (NPRD Report A03)

The following Annual Report of Cumulative Component Reliability (NPRD Report A03) is a summary of operating statistics by generic classifications for all safety-related components in the NPRD System. The report covers the period between July 1, 1974 and December 31, 1980. Component reliability is presented in two parts in the report. Part I presents a statistical summary for all components in a generic component class (e.g., ACCUMULATORS) over all systems and utilities. Part II presents detailed reliability statistics for components grouped by selective categories within a generic component class (e.g., ACCUMULATORS: Liquid, Pressurized). Part II follows Part I for each group in the report.

Part I — Description

The component population data, operating data, and failure data are presented in statistical summaries for each generic component class. The summaries include the number of components in a category, the calendar hours (in millions), the number of failures reported, and the out-of-service hours. The hours were calculated from data supplied by the Utilities in the engineering data reports (Report Form NPRD-2) and the quarterly operating reports (Report Form NPRD-3). The out-of-service hours were calculated from data supplied by the Utilities in the failure reports (Report Form NPRD-4) and are shown for the highest average, and lowest values reported.

For each generic component class there are bar charts that show population and the number of failures by TYPE/CATEGORY and by APPLICATION FUNCTION respectively. In addition, there are bar charts that present the number of failures by FAILURE DETECTION METHOD and by STATUS AT TIME OF FAILURE, respectively, for each generic component class.

Part II — Description

Statistics for component population, calendar hours, number of failures, failure hours (out-of-service hours and restoration hours), number of systems, and number of reporting units are shown for each classification of components in the NPRD data base. The grouping of components having the same engineering descriptive data is a selective process using the engineering data classification entries found in Table 3 of the NPRD System Reporting Procedures Manual. The total number of components in each group includes only those components reported by Utilities with corresponding engineering descriptive data (Table 3) entered in the engineering data reports (Report Form NPRD-2). The total operating and calendar hours are calculated from data supplied in the NPRD-2 reports and quarterly operating reports (Report Form NPRD-3). The out-of-service and restoration hours are calculated from data supplied in the failure reports (Report Form NPRD-4). The number of units is determined from the number of plant-units which identified the component type in their system in the NPRD data base.

Estimates of failure rate (Failures Per Million Calendar Hours) are derived from the calendar hours for component population and number of failures, which are based on information supplied in the NPRD-2, NPRD-3, and NPRD-4 reports. The NPRD-2 report is used to determine component population. The NPRD-3 report is used with data in the NPRD-2 report to calculate calendar hours, and the NPRD-4 report is used to determine the number of failures as well as to identify failure modes. These failure statistics are calculated from the reports received from Utilities through the end of the report period (December 31, 1980).

All reported failure modes of components are shown for each component classification along with the calculated statistics of failures per million calendar hours. The statistic, failures per million calendar hours, is calculated by taking the ratio of the number, n, of failures for each mode to the calendar hours, T. This ratio, n/T, is then multiplied by one million. These statistics are also calculated for each reported failure mode within each reporting utility, but are not shown in the tables. What is shown in the table is the range of failure rates across all utilities expressed as Minimum, 25th percentile, Median (50th percentile), 75th percentile, and Maximum values for each mode and across all modes for each category.

When no failures on components have been reported by Utilities, the ratio is 0.

A NOTE ON THE ESTIMATED FAILURES PER MILLION CALENDAR HOURS STATISTICS OF INDIVIDUAL FAILURE RATES

Individual component failure rates for each failure mode are calculated using the ratio n/T expressed in units of failures per million calendar hours. From these calculations, the estimates are ordered from the lowest to highest values and the Minimum, 25th percentile, Median (50th percentile), 75th percentile, and Maximum values are determined and shown for each failure mode and over all failure mode entries in the report.

Briefly, the statistics are:

(1) A point estimate of the failure rate for each component type by failure mode and by operating units and

(2) Using these ordered point estimates to form a sample distribution across operating units,

   (a) An estimate of the Median (50th percentile) of the sample distribution for each component type by each failure mode and over all failure modes for all operating units,

   (b) An estimate of the 25th percentile and 75th percentile values of the sample distribution for each component type by each failure mode and across all failure modes for all operating units, and

   (c) The Minimum and Maximum failure rates for each component type by individual failure mode and over all failure modes for all operating units

It is known that maintenance personnel perform on-line repairs in operating units and replace out-of-service components with spares; so, for all practical purposes, the population remains stable during the reporting period. The failure rate calculations are based on the situation where failed components are repaired or replaced. If a large number of components of the same classification are operating, and t_i (calendar hours) is the accumulated time of the ith component during the reporting period, then a point estimate of the failure rate, λ, is found from the ratio

$$\hat{\lambda} = \frac{n}{T}$$

and

$$T = \sum_{i=1}^{q} t_i$$

where T is the total calendar hours for the components in the classification, q is the number of components in the classification, and n is the number of failures which have occurred within a classification.

CALCULATION OF MINIMUM, 25TH PERCENTILE, MEDIAN, 75TH PERCENTILE, AND MAXIMUM VALUE FAILURE RATES

Given a group of data points, it is common practice in statistics to represent that group of data with one or a few calculated numbers. For the A03 Part 2, five statistics are chosen as those representatives, in addition to other data appearing in A03 Part 2. These statistics are the Minimum, 25th percentile (lower quartile, 1st quartile), Median (2nd quartile), 75th percentile (upper quartile, 3rd quartile), and Maximum of the observed points. First, each term is defined; then the method which we have used to calculate each statistic is described, and finally an example is given to illustrate the method.

Minimum and Maximum, as their names suggest, are the two observed values whose magnitudes are the least and the most, respectively. A 25th percentile is the point among the observed population where 25 percent or less of the population is smaller and 75 percent or more are larger than the lower quartile point. A Median, on the other hand, is the point of the population whose magnitude is presented in such a way that equal numbers of sample points are on each side. The 75th percentile is defined in the same manner as the 25th percentile.

In calculating these statistics for the annual report, the method suggested by Conover[1] was used.

Conover's method is illustrated in Table 3 for sample sizes up to 16. From the table it is apparent that the formulation shows a cyclic pattern. Thus, the table can be extended to accommodate larger sample sizes. The rules for determining the percentile by Conover's method for any sample size are given in Table 4. After the explanation of the notation used in Table 3, an example is given which illustrates the use of Table 4.

Notations used in Table 3 are as follows:

m : population size, m = 1, 2,. . . . . .

$\lambda[i]$: ith ordered (increasing) failure rate, where

i = 1, 2,. . . . . ., m indicates the rank of each point estimate of failure rates (λ) in that set.

For example:

$$\lambda_{[i]} = \lambda_{[1]} < \lambda_{[2]} < {}_{[3]} < \ldots\ldots < \lambda_{[m]}$$

$\lambda(.25)$ 25th percentile, lower quartile, or 1st quartile.

$\lambda(.75)$ 75th percentile, upper quartile, or 3rd quartile.

[1]W. J. Conover, *Practical Nonparametric Statistics*, New York, John Wiley & Son, Inc., 1971.

TABLE 3. ESTIMATES OF MINIMUM, λ(0.25), MEDIAN, λ(0.75), AND MAXIMUM USING THE EQUATIONS IN TABLE 4

m	MINIMUM	λ(0.25)	MEDIAN	λ(0.75)	MAXIMUM
1	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[1]}$
2	$\lambda_{[1]}$	$\lambda_{[1]}$	$1/2(\lambda_{[1]} + \lambda_{[2]})$	$\lambda_{[2]}$	$\lambda_{[2]}$
3	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[2]}$	$\lambda_{[3]}$	$\lambda_{[3]}$
4	$\lambda_{[1]}$	$1/2(\lambda_{[1]} + \lambda_{[2]})$	$1/2(\lambda_{[2]} + \lambda_{[3]})$	$1/2(\lambda_{[3]} + \lambda_{[4]})$	$\lambda_{[4]}$
5	$\lambda_{[1]}$	$\lambda_{[2]}$	$\lambda_{[3]}$	$\lambda_{[4]}$	$\lambda_{[5]}$
6	$\lambda_{[1]}$	$\lambda_{[2]}$	$1/2(\lambda_{[3]} + \lambda_{[4]})$	$\lambda_{[5]}$	$\lambda_{[6]}$
7	$\lambda_{[1]}$	$\lambda_{[2]}$	$\lambda_{[4]}$	$\lambda_{[6]}$	$\lambda_{[7]}$
8	$\lambda_{[1]}$	$1/2(\lambda_{[2]} + \lambda_{[3]})$	$1/2(\lambda_{[4]} + \lambda_{[5]})$	$1/2(\lambda_{[6]} + \lambda_{[7]})$	$\lambda_{[8]}$
9	$\lambda_{[1]}$	$\lambda_{[3]}$	$\lambda_{[5]}$	$\lambda_{[7]}$	$\lambda_{[9]}$
10	$\lambda_{[1]}$	$\lambda_{[3]}$	$1/2(\lambda_{[5]} + \lambda_{[6]})$	$\lambda_{[8]}$	$\lambda_{[10]}$
11	$\lambda_{[1]}$	$\lambda_{[3]}$	$\lambda_{[6]}$	$\lambda_{[9]}$	$\lambda_{[11]}$
12	$\lambda_{[1]}$	$1/2(\lambda_{[3]} + \lambda_{[4]})$	$1/2(\lambda_{[6]} + \lambda_{[7]})$	$1/2(\lambda_{[9]} + \lambda_{[10]})$	$\lambda_{[12]}$
13	$\lambda_{[1]}$	$\lambda_{[4]}$	$\lambda_{[7]}$	$\lambda_{[10]}$	$\lambda_{[13]}$
14	$\lambda_{[1]}$	$\lambda_{[4]}$	$1/2(\lambda_{[7]} + \lambda_{[8]})$	$\lambda_{[11]}$	$\lambda_{[14]}$
15	$\lambda_{[1]}$	$\lambda_{[4]}$	$\lambda_{[8]}$	$\lambda_{[12]}$	$\lambda_{[15]}$
16	$\lambda_{[1]}$	$1/2(\lambda_{[4]} + \lambda_{[5]})$	$1/2(\lambda_{[8]} + \lambda_{[9]})$	$1/2(\lambda_{[12]} + \lambda_{[13]})$	$\lambda_{[16]}$

TABLE 4. RULES FOR DETERMINING NPRD STATISTICS OVER POPULATION SIZES

MINIMUM	=	$\lambda_{[1]}$	
λ(0.25)	=	$\lambda_{[j]}$	, if $m \neq 4k$, $k = 1, 2, 3, 4, \ldots, \infty$
		$1/2(\lambda_{[j]} + \lambda_{[j-1]})$	, if $m = 4k$, $k = 1, 2, 3, 4, \ldots, \infty$
			; where $j = 1 + \text{int}(m/4)$*
MEDIAN	=	$\lambda_{[\ell]}$	, if $m \neq 2k$, $k = 1, 2, 3, 4, \ldots, \infty$
		$1/2(\lambda_{[\ell]} + \lambda_{[\ell-1]})$	, if $m = 2k$, $k = 1, 2, 3, 4, \ldots, \infty$
			; where $\ell = 1 + \text{int}(m/2)$*
λ(0.75)	=	$\lambda_{[p]}$	, if $m \neq 4k$, $k = 1, 2, 3, 4, \ldots, \infty$
		$1/2(\lambda_{[p]} + \lambda_{[p+1]})$	, if $m = 4k$, $k = 1, 2, 3, 4, \ldots, \infty$
			; where $p = m - \text{int}(m/4)$*
MAXIMUM	=	λ[m]	

*int(m/4) stands for the integer part of the ratio m/4. For instance, for m = 3, int(m/4) = 0, and for m = 10, int(m/4) = int(10/4) = 2.

The example given next illustrates the results presented in the A03 Part 2 of the Annual Report.

For VALVEX, Globe, Electric Motor/Servo, 0.5 to 1.99 inches, the following data have been collected:

Utility	Failure Mode	n	T	$\lambda = n/T$ (million)
A	—	0	8,760	0
B	—	0	39,312	0
C	—	0	14,596	0
D	—	0	168,309	0
E	—	0	27,030	0
F	—	0	48,876	0
G	—	0	39,196	0
H	—	0	39,196	0
I	—	0	128,534	0
J	—	0	95,283	0
K	—	0	140,162	0
L	—	0	117,780	0
M	—	0	123,027	0
N	—	0	53,896	0
P	—	0	2,920	0
R	LEAK	2	569,801	3.51
S	LEAK	1	247,523	4.04
T	WON'T START /MOVE	2	246,305	8.12
U	WON'T CLOSE	1	398,406	2.51
V	WON'T OPEN	1	185,185	5.40
W	OUT OF ADJUSTMENT	1	131,406	7.61
R	UNDEFINED	2	569,801	3.51

The ordered set of the failure rates (n/T) for failure modes is:

LEAK	000000000000000	0	0	0	0	3.51	4.04
WON'T START/MOVE	00000000000000	0	0	0	0	0	8.12
WON'T CLOSE	00000000000000	0	0	0	0	0	2.51
WON'T OPEN	00000000000000	0	0	0	0	0	5.40
OUT OF ADJUSTMENT	00000000000000	0	0	0	0	0	7.61
UNDEFINED	0000000000000	0	0	0	0	0	3.51
TOTAL	0000000000000	2.51	4.04	5.40	7.02*	7.61	8.12

*NOTE: Utility R reported 2 failure modes (LEAK & UNDEFINED), total is the sum.

m, the population size for this set of data, is 21. Using the formulation in Table 4:

Minimum : $\lambda[1]$
$\lambda(0.25)$: $\lambda[6]$
Median : $\lambda[11]$
$\lambda(0.75)$: $\lambda[16]$
Maximum : $\lambda[21]$

The data are presented in the report as:

Failure Mode	No. Fail	No. Unit	Minimum	25th Percentile	Median	75th Percentile	Maximum
LEAK	3	2	0	0	0	0	4.04
WON'T START/ MOVE	2	1	0	0	0	0	8.12
WON'T CLOSE	1	1	0	0	0	0	2.51
WON'T OPEN	1	1	0	0	0	0	5.40
OUT OF ADJUSTMENT	1	1	0	0	0	0	7.61
UNDEFINED	2	1	0	0	0	0	3.51
TOTAL	10	6	0	0	0	2.51	8.12

NOTES ON COMPONENT DATA PRESENTATION

(1) The component classification "OTHER" is a designated description in Table 3 of the NPRDS Reporting Procedures Manual, and it appears in the report where it applies.

(2) The component classification entry "UNDEFINED" is assigned to component data in the data base where the Utilities have left the engineering description codes blank on the NPRD-2 reports.

(3) Components with less than 500 calendar hours are ignored and are not reflected in any summaries.

(4) Component classifications with less than 500 calculated total operating hours will appear as "--" in the report. (There are not enough significant digits shown, and any number less than 500 will round off to zero.)

(5) Large differences between the operating hours and calendar hours which appear in the report are due principally to calculated low operating hours. This is due to components which are reported in the NPRD-2 reports by Utilities to have very low percentages of estimated operation in safety-related functions, and the corresponding calculated operating hours will be a low value as compared with calendar hours of service.

(6) Deviations from trend patterns, as compared with previous reports, are due to Utilities resubmitting engineering data and failure reports for components, and the basis upon which failure rate statistics are calculated.

(7) When the number of observations (reporting units) are small, large variations of percentile values may occur; and these sample sizes must be taken into consideration when using the data.

(8) Under the heading "failures per million calendar hours," the Minimum is the lowest calculated failure rate from an individual unit, and the Maximum is the highest calculated failure rate from an individual unit.

(9) Component Failure Reports (Report Form NPRD-4) with no corresponding Engineering Reports (Report Form NPRD-2) are ignored and are not reflected in any summaries.

MARGIN INDEX

To use, bend book in half and follow margin index to page with black edge marker.

ACCUMULATORS (ACCUMU)

AIR/GAS DRYERS (AIRDRY)

ANNUNCIATOR MODULES (ANNUNC)

BATTERIES AND CHARGERS (BATTRY)

BLOWERS (BLOWER)

CIRCUIT/CLOSERS/INTERRUPTERS (CKTBRK)

CONTROL RODS (CONROD)

CONTROL ROD DRIVE MECHANISMS (CRDRVE)

DEMINERALIZERS (DEMINX)

ELECTRICAL CONDUCTORS (ELECON)

ENGINES, INTERNAL COMBUSTION (ENGINE)

FILTERS/STRAINERS (FILTER)

GENERATORS (GENERA)

HEATERS, ELECTRIC (HEATER)

HEAT EXCHANGERS (HTEXCH)

INSTRUMENTATION AND CONTROLS (INSTRU)

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MOTORS (MOTORX)

PENETRATIONS, PRIMARY CONTAINMENT (PENETR)

PIPES, FITTINGS (PIPEXX)

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RECOMBINERS (RECOMB)

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SHOCK SUPPRESSORS AND SUPPORT (SUPORT)

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TURBINES (TURBIN)

VALVES (VALVEX)

VALVE OPERATORS (VALVOP)

VESSELS, PRESSURE (VESSEL)

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

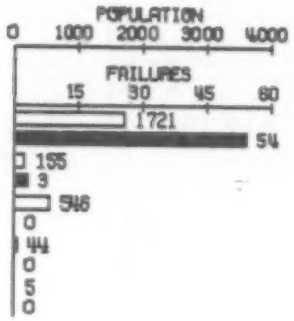
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

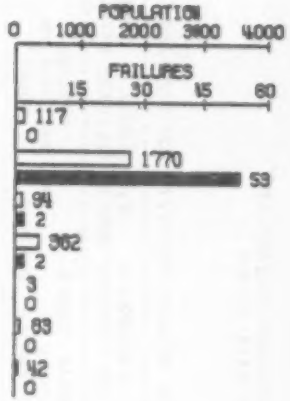
ACCUMULATIVE

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ACCUMULATORS	2471	119.9848	57	1160	108	1

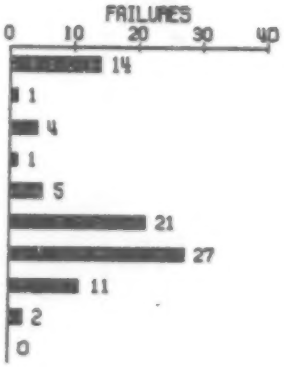
TYPE/CATEGORY



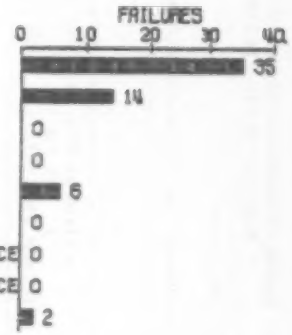
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ACCUMULATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
LIQUID, PRESSURIZED			1721	55.557 85.033	54	97	45
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * .25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	46	5	.00	.00	.00	.00	25.15	81	528	81	1
BREACH	1	1	.00	.00	.00	.00	.17	8	8	8	8
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	.10	85	85	85	85
FRACTURE/BREAK	1	1	.00	.00	.00	.00	5.85	8	8	8	8
WON'T CLOSE	1	1	.00	.00	.00	.00	.10	26	26	26	26
WON'T OPEN	2	2	.00	.00	.00	.00	1.93	30	51	30	9
OUT OF LIMITS	1	1	.00	.00	.00	.00	.17	124	124	124	124
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.10	7	7	7	7
TOTAL	54	7	.00	.00	.00	.00	27.08	75	528	75	1
LIQUID, UNPRESSURIZED				155		5.131 7.246	3	78		42
COLLAPSE	2	2	.00	.00	.00	.00	3.61	739	1160	739	317
FRACTURE/BREAK	1	1	.00	.00	.00	.00	10.96	643	643	643	643
TOTAL	3	3	.00	.00	.00	.00	10.96	707	1160	707	317
GAS				546		21.818 24.963	0	29		17

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ACCUMULATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER	44	2.231	0	3	3
		2.469			
UNDEFINED	5	.182	0	1	1
		.274			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

best copy available

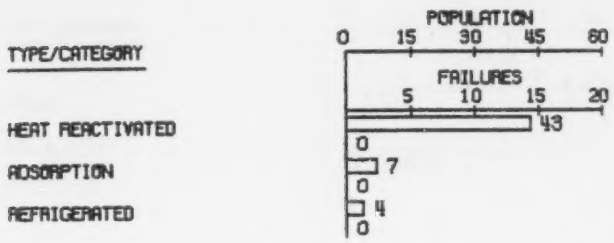
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

AIRDRY

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
AIR DRYERS	54	1.9112	0	0	0	0



FAILURES POPULATION

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 7/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

AIR DRYERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE / MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST / AVERAGE / LOWEST
HEAT REACTIVATED			43			.717	0 1 1
						1.433	
ADSORPTION			7			.110	0 2 2
						.268	
REFRIGERATED			4			.140	0 1 1
						.210	

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD# 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

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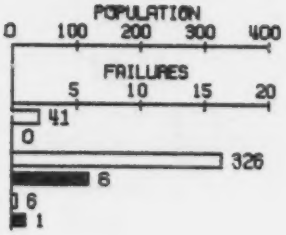
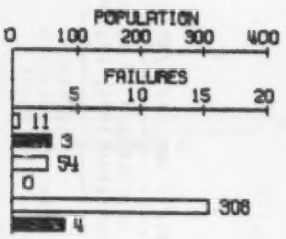
COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ANNUNCIATOR MODULES	373	19.9322	7	240	73	18

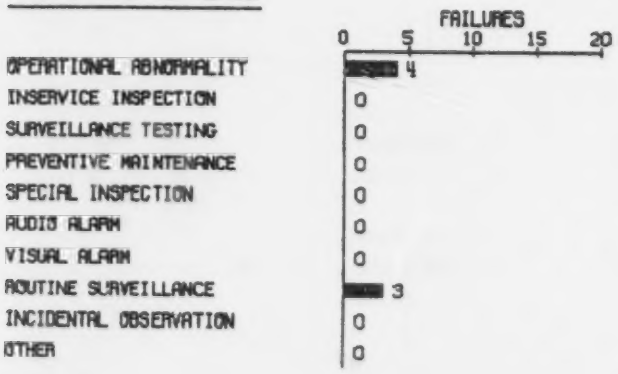
TYPE/CATEGORY



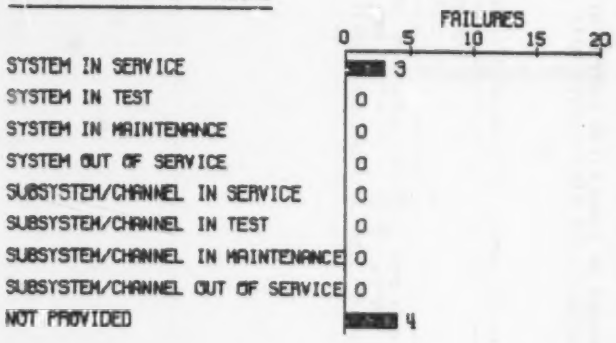
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ANNUNCIATOR MODULES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
RELAY			41	.877 1.768	0	8	7
SOLID STATE			326	1.809 17.825	6	17	10
UNDEFINED			6	.249 .339	1	2	2

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	.00	.00	.46	240	240	240	240
FALSE RESPONSE	3	3	.00	.00	.00	.46	20.75	31	48	31	22
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	.92	42	66	42	18
TOTAL	6	3	.00	.00	.00	.89	20.75	70	240	70	18
OUT OF LIMITS	1	1	.00	.00	4.50	9.01	9.01	96	96	96	96
TOTAL	1	1	.00	.00	4.50	9.01	9.01	96	96	96	96

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

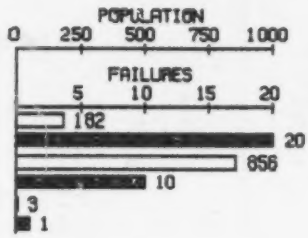
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

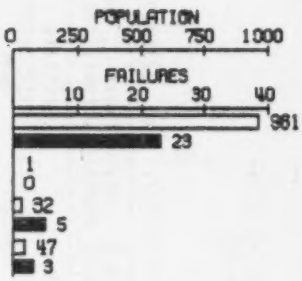
COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BATTERIES & CHARGERS	1041	48.2428	31	5841	522	1

BATTRY

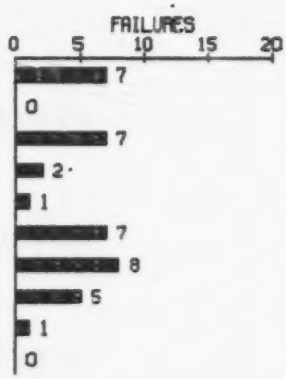
TYPE/CATEGORY



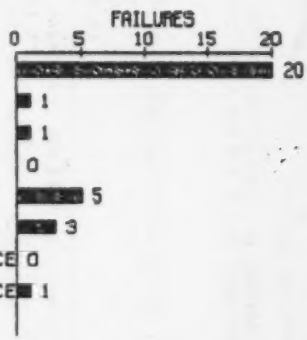
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 7/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

BATTERIES & CHARGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHARGING UNIT MULTIPLE CELL,PREACTIVATED			78	3.570	12	15	15
				3.719			
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	2	2	.00	.00	.00	.00	5.00	123	197	123	48
SPURIOUS OPERATION	4	2	.00	.00	.00	.00	17.55	1962	3938	1962	3
FALSE RESPONSE	5	2	.00	.00	.00	.00	26.33	33	97	33	2
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	5.85	147	147	147	147
TOTAL	12	5	.00	.00	.00	5.85	43.89	700	3938	700	2
CHARGING UNIT MULTIPLE CELL,RESERVE			23	1.145	0	7	5
				1.253			
CHARGING UNIT OTHER			38	1.563	5	12	11
				1.746			
WON'T START/MOVE	1	1	.00	.00	.00	.00	6.30	90	90	90	90
OUT OF LIMITS	2	2	.00	.00	.00	.00	8.78	90	172	90	7
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.95	102	102	102	102
FALSE RESPONSE	1	1	.00	.00	.00	.00	6.30	8	8	8	8
TOTAL	5	3	.00	.00	.00	3.90	12.61	76	172	76	7

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

BATTERIES & CHARGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHARGING UNIT UNDEFINED			43	1.779 2.016	3	11	11

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	.00	7.61	1	1	1	1
SPURIOUS OPERATION	1	1	.00	.00	.00	7.61	26	26	26	26
FALSE RESPONSE	1	1	.00	.00	.00	4.39	214	214	214	214
TOTAL	3	2	.00	.00	.00	15.21	80	214	80	1

WET CELL MULTIPLE CELL,PREACTIVATED					414		11.457 22.086	7	39	37
FRACTURE/BREAK	1	1	.00	.00	.00	8.78	1371	1371	1371	1371
OUT OF LIMITS	2	2	.00	.00	.00	10.10	16	23	16	8
OUT OF ADJUSTMENT	1	1	.00	.00	.00	3.43	5	5	5	5
OTHER (SEE REMARKS)	3	2	.00	.00	.00	22.76	34	49	34	5
TOTAL	7	5	.00	.00	.00	22.76	216	1371	216	5

WET CELL MULTIPLE CELL,RESERVE					320		12.952 13.516	1	8	6
OUT OF LIMITS	1	1	.00	.00	.00	6.71	5641	5641	5641	5641
TOTAL	1	1	.00	.00	.00	6.71	5641	5641	5641	5641

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 7/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

BATTERIES & CHARGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WET CELL											
SINGLE CELL,PREACTIVATED					122		3.750	2	2		2
							3.737				
OTHER (SEE REMARKS)	2	1	.00	.00	.27	.55	.55	6	6	6	6
TOTAL	2	1	.00	.00	.27	.55	.55	6	6	6	6
UNDEFINED											
MULTIPLE CELL,RESERVE					1		.001	0	1		1
							.055				
UNDEFINED											
UNDEFINED					2		--	1	1		1
							.114				
FRACTURE/BREAK	1	1	8.78	8.78	8.78	8.78	8.78	8	8	8	8
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78	8	8	8	8

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

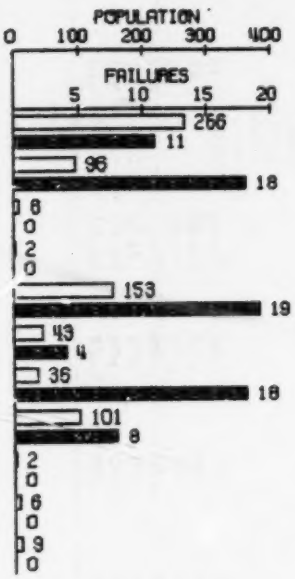
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

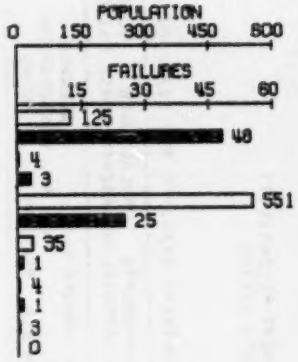
COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BLOWERS	722	30.3303	78	7492	346	1

BLOWER

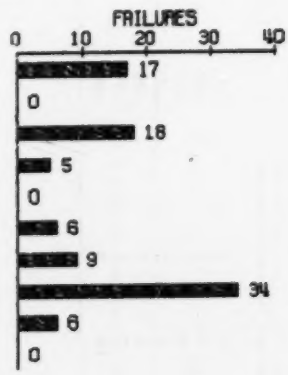
TYPE/CATEGORY



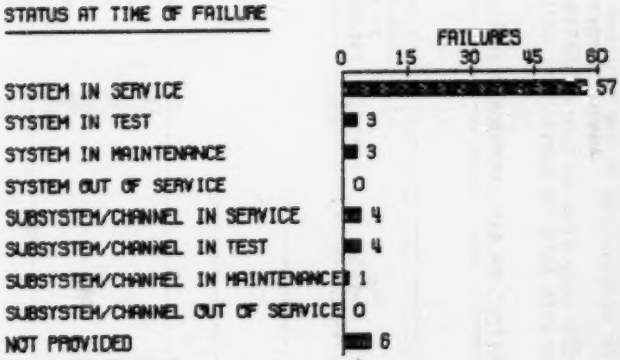
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

BLOWERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS				OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
AXIAL,SINGLE STAGE									266	7.423	11	37		22
										11.056				
LEAK	1	1	.00	.00	.00	.00	3.78	12				12	12	12
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.35	310				310	310	310
COLLAPSE	1	1	.00	.00	.00	.00	26.31	120				120	120	120
WON'T START/MOVE	4	3	.00	.00	.00	.00	26.31	177				648	177	8
OUT OF LIMITS	1	1	.00	.00	.00	.00	5.10	48				48	48	48
OUT OF ADJUSTMENT	3	2	.00	.00	.00	.00	5.22	32				94	32	1
TOTAL	11	8	.00	.00	.00	3.78	52.62	117				648	117	1
AXIAL,TWO OR MORE STAGES									96	1.737	18	23		18
										3.413				
LEAK	9	2	.00	.00	.00	.00	15.56	30				70	30	6
PHYSICAL DISTORTION	4	1	.00	.00	.00	.00	14.88	28				55	28	3
WON'T START/MOVE	1	1	.00	.00	.00	.00	7.33	33				33	33	33
WON'T STOP	1	1	.00	.00	.00	.00	5.28	822				822	822	822
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	3.72	21				21	21	21
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	28.53	363				550	363	175
TOTAL	18	5	.00	.00	.00	5.28	28.53	110				822	110	3
RADIAL,HORIZONTAL SHAFT									8	.171	0	6		5
										.392				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

BLOWERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PNEUMATIC EDUCTOR										
COMPONENTS IN CATEGORY: 2							.099	0	1	1
OP/CALENDAR HOURS(MILLIONS): .110										
TOTAL FAILURES: 0										
NUMBER OF SYSTEMS: 1										
NUMBER OF UNITS: 1										
CENTRIFUGAL,SINGLE STAGE										
COMPONENTS IN CATEGORY: 153							4.041	19	41	26
OP/CALENDAR HOURS(MILLIONS): 6.721										
TOTAL FAILURES: 19										
NUMBER OF SYSTEMS: 41										
NUMBER OF UNITS: 26										
LEAK	4	2	.00	.00	.00	.00	5.40	66	88	66	23
PHYSICAL DISTORTION	3	3	.00	.00	.00	.00	7.61	32	45	32	24
FRACTURE/BREAK	1	1	.00	.00	.00	.00	1.73	6	6	6	6
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.10	42	42	42	42
WON'T CLOSE	1	1	.00	.00	.00	.00	4.39	2	2	2	2
WON'T OPEN	1	1	.00	.00	.00	.00	2.70	1	1	1	1
OUT OF LIMITS	2	1	.00	.00	.00	.00	3.46	46	63	46	28
SPURIOUS OPERATION	3	3	.00	.00	.00	.00	7.61	178	212	178	123
OTHER (SEE REMARKS)	3	2	.00	.00	.00	.00	18.03	114	144	114	55
TOTAL	19	7	.00	.00	.00	1.34	18.03	73	212	73	1
CENTRIFUGAL,MULTI-STAGE										
COMPONENTS IN CATEGORY: 43							.313	4	8	4
OP/CALENDAR HOURS(MILLIONS): 1.836										
TOTAL FAILURES: 4										
NUMBER OF SYSTEMS: 8										
NUMBER OF UNITS: 4										
LEAK	2	1	.00	.00	.00	.00	1.85	56	94	56	17
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.92	1280	1280	1280	1280
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.92	90	90	90	90
TOTAL	4	1	.00	.00	.00	.00	3.70	370	1280	370	17

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

BLOWERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
POSITIVE DISPLACEMENT	36	.216 1.596	18	12	11

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	10	3	.00 .00	.00	12.38	70.97	127	790	127	6
BREACH	2	2	.00 .00	.00	.00	12.38	27	45	27	8
PHYSICAL DISTORTION	1	1	.00 .00	.00	.00	3.62	1131	1131	1131	1131
WON'T START/MOVE	1	1	.00 .00	.00	.00	8.78	11	11	11	11
OUT OF LIMITS	1	1	.00 .00	.00	.00	8.78	465	465	465	465
SPURIOUS OPERATION	2	1	.00 .00	.00	.00	17.55	2	2	2	2
OTHER (SEE REMARKS)	1	1	.00 .00	.00	.00	8.78	24	24	24	24
TOTAL	18	4	.00 .00	.00	24.76	70.97	165	1131	165	2

ROTARY VANE	101		2.100 4.613	8	17	15

PHYSICAL DISTORTION	2	2	.00 .00	.00	.00	2.36	132	152	132	111
WON'T START/MOVE	2	2	.00 .00	.00	.00	8.78	1165	2328	1165	1
OUT OF LIMITS	2	1	.00 .00	.00	.00	3.80	7492	7492	7492	7492
FALSE RESPONSE	1	1	.00 .00	.00	.00	2.36	50	50	50	50
OTHER (SEE REMARKS)	1	1	.00 .00	.00	.00	2.36	249	249	249	249
TOTAL	8	5	.00 .00	.00	3.80	8.78	2234	7492	2234	1

EJECTOR	2		.029 .057	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

BLOWERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER	6	.165	0	3	3
		.259			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
UNDEFINED										
							.065	0	4	4
							.378			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

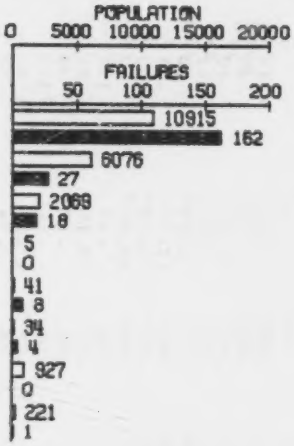
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

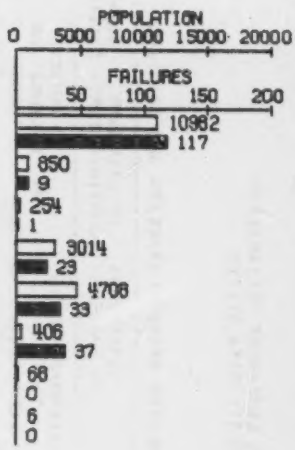
COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CIRCUIT CLOSERS/INTERRUPTERS	20268	924.8039	220	3411	135	0

CKTBRK

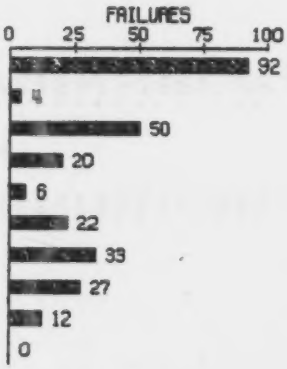
TYPE/CATEGORY



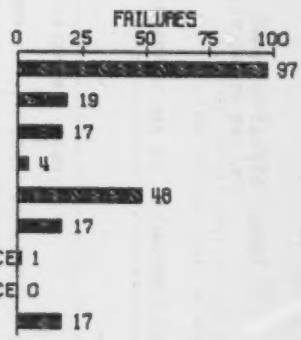
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,METAL CLAD THERMAL	499	17.663 22.101	4	28	

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.20	1	1	1	1
WON'T CLOSE	2	1	.00	.00	.00	.00	1.60	26	29	26	22
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.20	2	2	2	2
TOTAL	4	2	.00	.00	.00	.00	1.60	14	29	14	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,METAL CLAD MAGNETIC	7156	98.181 332.041	114	230	51

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.36	19	19	19	19
CRACK	1	1	.00	.00	.00	.00	.34	25	25	25	25
PHYSICAL DISTORTION	15	3	.00	.00	.00	.00	9.97	20	244	20	3
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.27	162	162	162	162
FRACTURE/BREAK	3	3	.00	.00	.00	.00	6.51	30	48	30	8
WON'T START/MOVE	17	9	.00	.00	.00	.00	17.74	27	384	48	0
WON'T STOP	1	1	.00	.00	.00	.00	5.69	5	5	5	5
WON'T CLOSE	24	11	.00	.00	.00	.00	44.40	47	337	67	0
WON'T OPEN	7	5	.00	.00	.00	.00	.47	177	607	177	0
WON'T HOLD	7	5	.00	.00	.00	.00	2.71	21	36	21	4
WON'T RELEASE	2	2	.00	.00	.00	.00	.17	30	53	30	6
OUT OF LIMITS	1	1	.00	.00	.00	.00	.44	135	135	135	135
OUT OF ADJUSTMENT	9	7	.00	.00	.00	.00	17.07	42	99	42	1
SPURIOUS OPERATION	15	9	.00	.00	.00	.00	1.04	372	3411	372	0
FALSE RESPONSE	4	4	.00	.00	.00	.00	.44	51	141	51	4
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	.13	20	20	20	20
NO OUTPUT	1	1	.00	.00	.00	.00	.77	1	1	1	1
OVERHEATING	1	1	.00	.00	.00	.00	.17	18	18	18	18
IMPROPER TIMING	2	1	.00	.00	.00	.00	.51	339	677	339	1
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.25	57	57	57	57
TOTAL	114	26	.00	.00	.11	1.80	53.21	101	3411	101	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

COMPONENTS IN CATEGORY | OP/CALENDAR HOURS(MILLIONS) | TOTAL FAILURES | NUMBER OF SYSTEMS | NUMBER OF UNITS

INDOOR,METAL CLAD MOTOR: 650 | 21.665 / 31.142 | 31 | 52 | 26

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.26	5	5	5	5
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.88	8	8	8	8
WON'T START/MOVE	3	3	.00	.00	.00	.00	.87	9	16	9	3
WON'T STOP	2	1	.00	.00	.00	.00	1.06	54	104	54	3
WON'T CLOSE	14	8	.00	.00	.00	.51	13.16	11	91	11	0
WON'T OPEN	3	3	.00	.00	.00	.00	.71	16	42	16	1
WON'T HOLD	1	1	.00	.00	.00	.00	.53	782	782	782	782
OUT OF LIMITS	1	1	.00	.00	.00	.00	18.03	96	96	96	96
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.53	3	3	3	3
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	.95	3	3	3	2
SHORT	1	1	.00	.00	.00	.00	.26	6	6	6	6
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.26	8	8	8	8
TOTAL	31	10	.00	.00	.00	2.37	18.03	40	782	40	0

INDOOR,METAL CLAD MANUAL: 1467 | 29.506 / 65.548 | 11 | 42 | 21

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	1	1	.00	.00	.00	.00	.47	1057	1057	1057	1057
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	32.88	610	610	610	610
WON'T START/MOVE	2	1	.00	.00	.00	.00	.95	963	1922	963	4
WON'T CLOSE	2	1	.00	.00	.00	.00	.84	11	17	11	4
OUT OF LIMITS	1	1	.00	.00	.00	.00	.47	580	580	580	580
SPURIOUS OPERATION	4	2	.00	.00	.00	.00	1.42	172	623	172	6
TOTAL	11	4	.00	.00	.00	.00	32.88	444	1922	444	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,METAL CLAD THERMAL MAGNETIC	430	7.562 17.949	0	9	9
INDOOR,METAL CLAD OTHER	60	2.170 2.291	1	4	4
INDOOR,METAL CLAD UNDEFINED	653	14.825 26.394	1	10	10
INDOOR,SEALED THERMAL	445	8.278 21.497	0	16	13

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	22.76	24	24	24	24
TOTAL	1	1	.00	.00	.00	.00	22.76	24	24	24	24
WON'T CLOSE	1	1	.00	.00	.00	.00	17.56	250	250	250	250
TOTAL	1	1	.00	.00	.00	.00	17.56	250	250	250	250

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,SEALED MAGNETIC	1336	30.365 63.263	6	50	25

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	.34	2	2	2	2
WON'T CLOSE	2	2	.00	.00	.00	.00	1.17	17	24	17	10
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	.34	794	1585	794	3
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.40	20	20	20	20
TOTAL	6	4	.00	.00	.00	.00	1.40	274	1585	274	2

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,SEALED MOTOR	152	1.487 6.850	4	19	7

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	.46	43	43	43	43
WON'T CLOSE	1	1	.00	.00	.00	.00	.68	8	8	8	8
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.60	1	1	1	1
WON'T CONTROL	1	1	.00	.00	.00	.00	.68	4	4	4	4
TOTAL	4	3	.00	.00	.00	1.35	1.60	14	43	14	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	CP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,SEALED MANUAL			3581	66.823 / 167.386	17	126	21
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.12	3	3	3	3
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.31	8	8	8	8
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.12	6	6	6	6
WON'T START/MOVE	2	2	.00	.00	.00	.00	1.94	202	333	202	70
WON'T CLOSE	5	5	.00	.00	.00	.00	1.94	237	536	237	5
WON'T HOLD	1	1	.00	.00	.00	.00	.25	8	8	8	8
WON'T RELEASE	1	1	.00	.00	.00	.00	.21	74	74	74	74
OUT OF LIMITS	1	1	.00	.00	.00	.00	.12	62	62	62	62
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	.31	177	336	177	18
FALSE RESPONSE	1	1	.00	.00	.00	.00	.12	20	20	20	20
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	1.30	949	949	949	949
TOTAL	17	8	.00	.00	.00	.24	3.88	181	949	181	3
INDOOR,SEALED OTHER			453	18.562 / 19.108	0	6	4
INDOOR,SEALED UNDEFINED			109	3.587 / 4.280	0	3	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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NPRD REPORT A03 (PART 2)
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDOOR,UNENCLOSED THERMAL	12	-- / .789	0	1	1
INDOOR,UNENCLOSED MAGNETIC	1078	3.392 / 49.309	3	20	8
INDOOR,UNENCLOSED MOTOR	37	.269 / 1.571	0	8	3
INDOOR,UNENCLOSED MANUAL	942	10.986 / 46.417	15	97	17

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BREACH	1	1	.00	.00	.00	.00	5.85	4	4	4	4
WON'T CLOSE	2	2	.00	.00	.00	.00	.11	26	45	26	6
TOTAL	3	3	.00	.00	.00	.00	5.85	18	45	18	4
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.31	3	3	3	3
FRACTURE/BREAK	3	2	.00	.00	.00	.00	17.79	15	26	15	7
WON'T START/MOVE	3	3	.00	.00	.00	.00	3.03	902	2609	902	24
WON'T CLOSE	3	2	.00	.00	.00	.00	6.06	21	54	21	1
WON'T OPEN	1	1	.00	.00	.00	.00	1.93	4	4	4	4
OUT OF LIMITS	3	1	.00	.00	.00	.00	.37	3	3	3	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.12	103	103	103	103
TOTAL	15	5	.00	.00	.00	.62	17.79	195	2609	195	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			FAILURES PER MILLION CALENDAR HOURS									
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUTDOOR,METAL CLAD MAGNETIC						4		-- / .114	0	1		1
OUTDOOR,METAL CLAD UNDEFINED						1		.057 / .057	0	1		1
OUTDOOR,SEALED MAGNETIC						26		-- / 1.481	7	1		1
WON'T CLOSE	5	1	3.38	3.38	3.38	3.38	3.38	537	1953	537		46
WON'T OPEN	2	1	1.35	1.35	1.35	1.35	1.35	375	725	375		24
TOTAL	7	1	4.73	4.73	4.73	4.73	4.73	491	1953	491		24
OUTDOOR,SEALED MOTOR						6		.260 / .325	0	2		2
OUTDOOR,SEALED MANUAL						8		-- / .456	0	2		1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OUTDOOR,SEALED UNDEFINED			1	--	1	1	1
				.057			
WON'T CLOSE	1	1					
TOTAL	1	1					

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T CLOSE	1	1	17.56	17.56	17.56	17.56	17.56	233	233	233	233
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56	233	233	233	233

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OUTDOOR,ENCLOSED MAGNETIC			10	.273	3	2	1
				.570			
WON'T START/MOVE	1	1					
SPURIOUS OPERATION	2	1					
TOTAL	3	1					

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	1.76	1.76	1.76	1.76	1.76	78	78	78	78
SPURIOUS OPERATION	2	1	3.51	3.51	3.51	3.51	3.51	12	18	12	6
TOTAL	3	1	5.27	5.27	5.27	5.27	5.27	34	78	34	6

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OUTDOOR,ENCLOSED MANUAL			24	1.089	1	4	1
				1.367			
SPURIOUS OPERATION	1	1					
TOTAL	1	1					

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SPURIOUS OPERATION	1	1	.73	.73	.73	.73	.73	19	19	19	19
TOTAL	1	1	.73	.73	.73	.73	.73	19	19	19	19

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER THERMAL			333	13.742	0	2	2
				14.122			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 241 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CIRCUIT CLOSERS/INTERRUPTERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER MAGNETIC			187		6.007	0	8	4
					6.930			
OTHER MANUAL			407		7.350	0	8	3
					8.928			
UNDEFINED MANUAL			215		.114	1	14	1
					12.245			
NOT OPEN	1	1	.45 .45 .45 .45 .45		138	138	138	138
TOTAL	1	1	.45 .45 .45 .45 .45		138	138	138	138
UNDEFINED UNDEFINED			6		.061	0	3	3
					.216			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

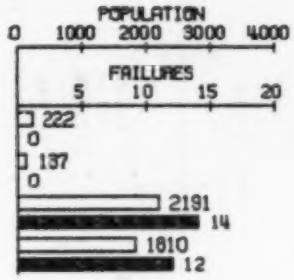
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

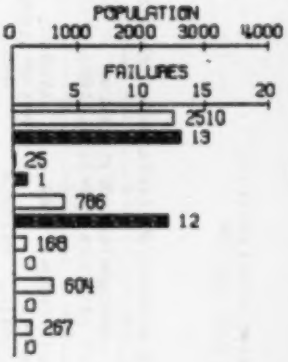
COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	 AVERAGE	 LOWEST
CONTROL RODS	4360	212.1536	26	2424	698	3

CONROD

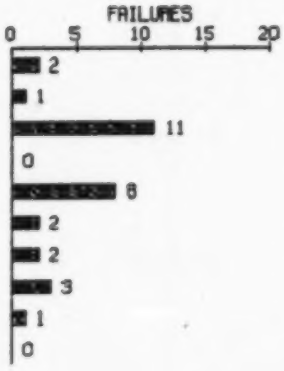
TYPE/CATEGORY



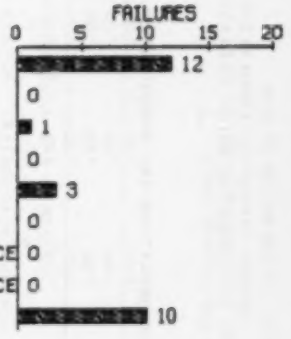
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CONTROL RODS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CYLINDRICAL BORON CARBIDE								68	3.449 3.595	0	1	1
CYLINDRICAL SILVER-INDIUM-CADMIUM								69	2.395 3.648	0	1	1
CYLINDRICAL OTHER								85	.609 .755	0	2	2
VANED BORON CARBIDE								137	3.906 3.906	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CONTROL RODS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
CRUCIFORM BORON CARBIDE									2130	61.470	14	14	14			
										113.636						
LEAK	3	2	.00	.00	.00	.00	.27	41						57	41	8
OUT OF LIMITS	9	2	.00	.00	.00	.00	11.75	888						1440	1315	312
DRIFT	1	1	.00	.00	.00	.00	.18	2424						2424	2424	2424
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.18	2327						2327	2327	2327
TOTAL	14	4	.00	.00	.00	.27	11.75	919						2424	1193	8
CRUCIFORM SILVER-INDIUM-CADMIUM									61	2.912	0	3	3			
										3.475						
CLUSTERED BORON CARBIDE									232	6.429	0	3	3			
										7.672						
CLUSTERED SILVER-INDIUM-CADMIUM									1230	52.576	12	22	22			
										58.218						
LEAK	7	2	.00	.00	.00	.00	2.59	199						1032	199	24
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.39	24						24	24	24
WON'T HOLD	2	1	.00	.00	.00	.00	1.06	3						3	3	3
FALSE RESPONSE	2	1	.00	.00	.00	.00	1.06	4						4	4	4
TOTAL	12	3	.00	.00	.00	.00	2.66	120						1032	120	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CONTROL RODS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
				OUT-OF-SERVICE HOURS	

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	HIGHEST	AVERAGE	LOWEST
CLUSTERED BOROSILICATE GLASS(12.5% B2 O3)							5.491	0	2	2
							5.491			
CLUSTERED OTHER							11.448	0	4	4
							11.758			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

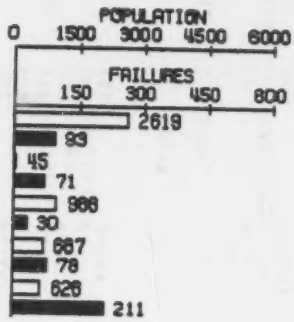
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

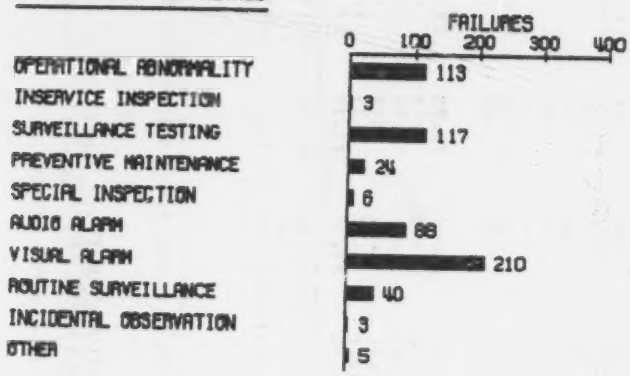
COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CONTROL ROD DRIVE MECHANISMS	4987	241.1635	483	7108	306	0

CRDRVE

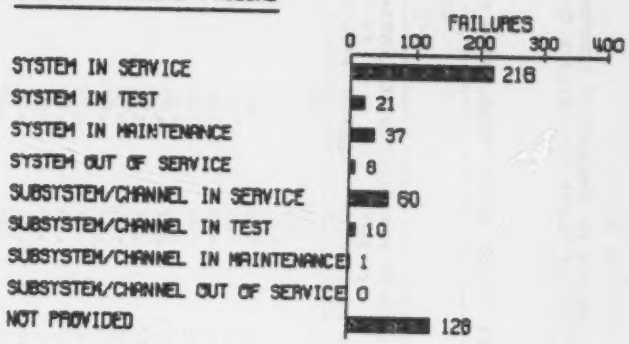
TYPE/CATEGORY



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES ■ POPULATION □

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CONTROL ROD DRIVE MECHANISMS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HYDRAULIC PISTON	2619	74.533 129.193	93	19	17

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	11	4	.00	.00	.00	.00	1.89	152	816	152	4
CRACK	15	1	.00	.00	.00	.00	177.40	109	192	109	24
PHYSICAL DISTORTION	2	2	.00	.00	.00	.00	.61	186	338	186	33
FRACTURE/BREAK	4	2	.00	.00	.00	.00	1.22	141	312	141	49
WON'T START/MOVE	7	2	.00	.00	.00	.00	.68	25	36	25	6
WON'T OPEN	1	1	.00	.00	.00	.00	2.19	1214	1214	1214	1214
OUT OF LIMITS	5	2	.00	.00	.00	.00	2.45	3720	5928	3720	360
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.22	3	3	3	3
SPURIOUS OPERATION	32	3	.00	.00	.00	.00	16.51	344	5047	344	3
FALSE RESPONSE	1	1	.00	.00	.00	.00	.17	1109	1109	1109	1109
OTHER (SEE REMARKS)	14	2	.00	.00	.00	.00	157.78	48	433	48	0
TOTAL	93	11	.00	.00	.39	1.89	189.23	398	5928	398	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
RACK AND PINION	45	1.652 2.563	71	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	61	1	23.80	23.80	23.80	23.80	23.80	713	3081	718	21
WON'T START/MOVE	2	1	.78	.78	.78	.78	.78	659	1317	659	0
OUT OF LIMITS	4	1	1.56	1.56	1.56	1.56	1.56	642	2184	642	24
SPURIOUS OPERATION	1	1	.39	.39	.39	.39	.39	864	864	864	864
FALSE RESPONSE	3	1	1.17	1.17	1.17	1.17	1.17	608	696	608	432
TOTAL	71	1	27.70	27.70	27.70	27.70	27.70	705	3081	710	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CONTROL ROD DRIVE MECHANISMS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
MAGNETIC JACK LATCH			988	38.525 45.910	30	22	22

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.73	16	16	16	16
WON'T START/MOVE	1	1	.00	.00	.00	.00	.33	4	4	4	4
WON'T HOLD	5	2	.00	.00	.00	.00	1.32	5	12	5	0
OUT OF LIMITS	21	2	.00	.00	.00	.00	9.29	130	580	130	107
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	1.21	2	2	2	2
TOTAL	30	4	.00	.00	.00	.00	9.29	92	580	92	0

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
LEAD SCREW/ROLLER NUT			687	22.386 31.784	78	19	19

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.27	21	21	21	21
CRACK	3	1	.00	.00	.00	.00	.75	1303	1368	1303	1174
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.26	12	12	12	12
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.27	17	17	17	17
FRACTURE/BREAK	3	1	.00	.00	.00	.00	.79	11	16	11	8
WON'T START/MOVE	13	5	.00	.00	.00	.28	1.33	110	1130	110	8
WON'T HOLD	2	2	.00	.00	.00	.00	.26	314	603	314	24
OUT OF LIMITS	14	3	.00	.00	.00	.00	1.98	119	429	119	13
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.28	4	4	4	4
SPURIOUS OPERATION	8	3	.00	.00	.00	.00	2.65	504	1296	504	4
FALSE RESPONSE	31	3	.00	.00	.00	.00	10.60	329	2376	329	4
TOTAL	78	6	.00	.00	.00	1.37	16.34	281	2376	281	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

CONTROL ROD DRIVE MECHANISMS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			FAILURES PER MILLION CALENDAR HOURS									
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST	
OTHER						628		19.954 31.732	211	6		6
LEAK	184	5	.00	1.90	5.60	32.88	65.42	170	7108	170		0
PHYSICAL DISTORTION	2	1	.00	.00	.00	.00	.29	19	19	19		18
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.15	6	6	6		6
WON'T START/MOVE	2	2	.00	.00	.00	.15	.61	14	24	14		3
WON'T OPEN	3	3	.00	.00	.07	.22	.61	692	2059	692		6
OUT OF LIMITS	14	2	.00	.00	.00	2.21	2.45	54	296	54		8
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.14	576	576	576		576
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.61	5	5	5		5
FALSE RESPONSE	2	1	.00	.00	.00	.00	.29	10	16	10		4
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.15	653	653	653		653
TOTAL	211	5	.00	2.17	7.33	32.88	69.70	168	7108	168		0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

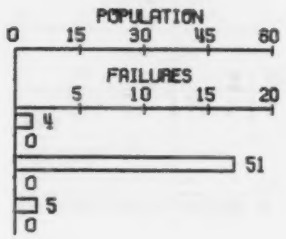
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

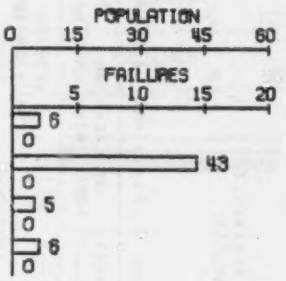
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
DEMINERALIZERS	60	2.9510	0	0	0	0

TYPE/CATEGORY



APPLICATION/FUNCTION



DEMINX

FAILURES [redacted] POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

DEMINERALIZERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ANION	4	.058 / .237	0	3	3
MIXED BED	51	1.331 / 2.476	0	19	18
CATION	5	.098 / .239	0	4	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ANION										
MIXED BED										
CATION										

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

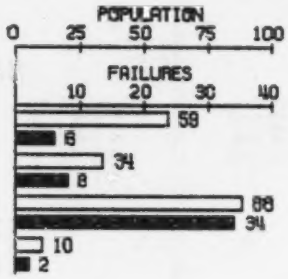
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

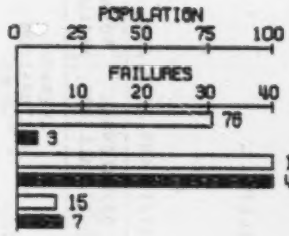
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ELECTRICAL CONDUCTORS	191	8.9741	50	1518	445	3

TYPE/CATEGORY



APPLICATION/FUNCTION



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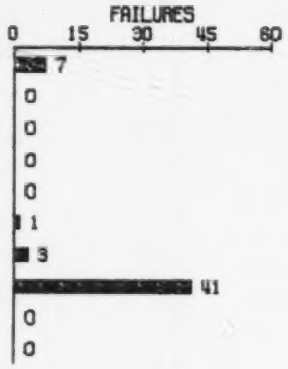
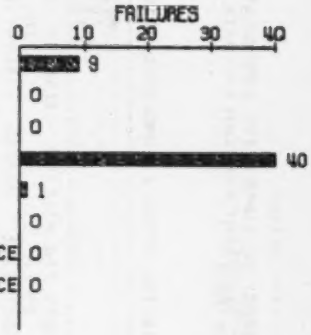
FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES ■ POPULATION □

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ELECTRICAL CONDUCTORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BUS															
POLYETHYLENE							.438	8		0	2	2			
							.439								
BUS															
POLYVINYL CHLORIDE							.314	11		0	2	1			
							.314								
BUS															
NONE							1.907	36		0	6	5			
							1.926								
BUS															
OTHER							.219	4		6	1	1			
							.228								
SPURIOUS OPERATION	6	1	26.33	26.33	26.33	26.33	26.33			70	120	70	20		
TOTAL	6	1	26.33	26.33	26.33	26.33	26.33			70	120	70	20		
CONTROL CABLE															
NEOPRENE							1.589	33		7	1	1			
							1.880								
CRACK	7	1	3.72	3.72	3.72	3.72	3.72			520	520	520	520		
TOTAL	7	1	3.72	3.72	3.72	3.72	3.72			520	520	520	520		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ELECTRICAL CONDUCTORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROL CABLE					
UNDEFINED	1	.058	1	1	1
		.057			
OTHER (SEE REMARKS)	1	26	1	1	1
TOTAL	1	26	1	1	1
POWER CABLE					
NEOPRENE	33	1.589	32	1	1
		1.880			
CRACK	32	520	1	1	1
TOTAL	32	520	1	1	1
POWER CABLE					
POLYETHYLENE	1	--	1	1	1
		.057			
FRACTURE/BREAK	1	3	1	1	1
TOTAL	1	3	1	1	1
POWER CABLE					
ALUMINUM	54	.710	1	1	1
		1.656			
PHYSICAL DISPLACEMENT	1	11	1	1	1
TOTAL	1	11	1	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER (SEE REMARKS)	1	1	17.56	17.56	17.56	17.56	17.56	26	26	26	26
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56	26	26	26	26
CRACK	32	1	17.02	17.02	17.02	17.02	17.02	520	520	520	520
TOTAL	32	1	17.02	17.02	17.02	17.02	17.02	520	520	520	520
FRACTURE/BREAK	1	1	17.56	17.56	17.56	17.56	17.56	3	3	3	3
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56	3	3	3	3
PHYSICAL DISPLACEMENT	1	1	.60	.60	.60	.60	.60	11	11	11	11
TOTAL	1	1	.60	.60	.60	.60	.60	11	11	11	11

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ELECTRICAL CONDUCTORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SIGNAL CABLE ETHYLENE PROPYLENE RUBBER	8	.406 .423	0	1	1
SIGNAL CABLE OTHER	2	.096 .114	2	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SPURIOUS OPERATION	2	1	17.56	17.56	17.56	17.56	17.56	763	1518	763	7
TOTAL	2	1	17.56	17.56	17.56	17.56	17.56	763	1518	763	7

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

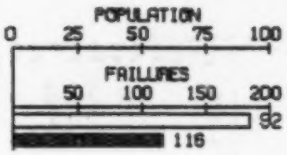
NPRD REPORT R03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

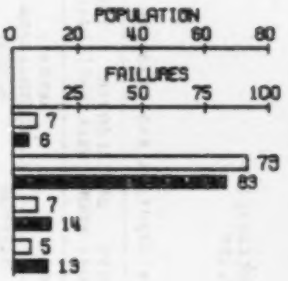
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ENGINES, INTERNAL COMBUSTION	92	4.3709	116	5400	255	0

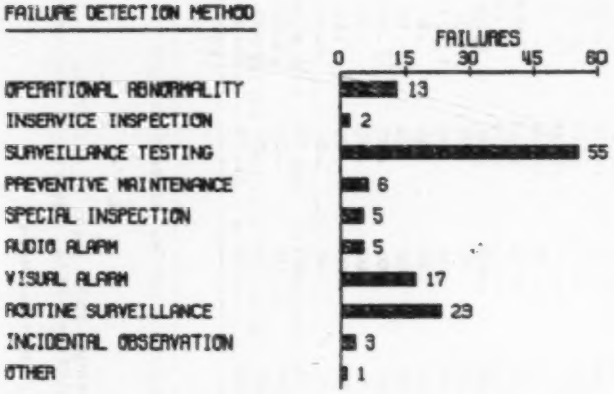
TYPE/CATEGORY



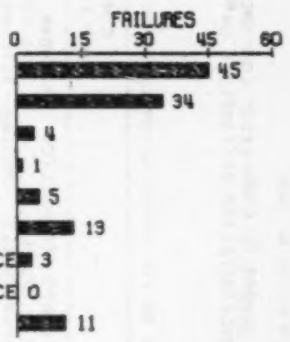
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



ENGINE

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ENGINES, INTERNAL COMBUSTION

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIESEL OR NO.2 FUEL OIL TWO STROKE RECIPR.,IN-LINE BLOCK	18	.059 .816	12	9	8

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	3	1	.00	.00	.00	26.33	20	56	20	1
CRACK	2	1	.00	.00	.00	36.50	3	5	3	0
PHYSICAL DISTORTION	1	1	.00	.00	.00	8.78	408	408	408	408
FRACTURE/BREAK	2	1	.00	.00	.00	17.55	13	24	13	2
WON'T START/MOVE	1	1	.00	.00	.00	8.78	3	3	3	3
WON'T CLOSE	1	1	.00	.00	.00	8.78	2	2	2	2
OUT OF LIMITS	1	1	.00	.00	.00	18.25	1	1	1	1
OTHER (SEE REMARKS)	1	1	.00	.00	.00	18.25	3	3	3	3
TOTAL	12	2	.00	.00	.00	73.01	42	408	42	0

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIESEL OR NO.2 FUEL OIL TWO STROKE RECIPROCATING,V-BLOCK	27	.113 1.328	47	11	11

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	5	4	.00	.00	.00	8.15	18.33	72	264	72	2
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	17.55	29	29	29	29
WON'T START/MOVE	21	4	.00	.00	.00	13.17	140.46	45	808	45	0
WON'T STOP	2	1	.00	.00	.00	.00	17.56	16	30	16	2
WON'T CLOSE	3	2	.00	.00	.00	.00	16.30	19	55	19	1
WON'T HOLD	1	1	.00	.00	.00	.00	8.15	0	0	0	0
WON'T RELEASE	1	1	.00	.00	.00	.00	8.15	24	24	24	24
OUT OF LIMITS	1	1	.00	.00	.00	.00	18.33	50	50	50	50
OUT OF ADJUSTMENT	3	3	.00	.00	.00	4.39	18.33	256	765	256	1
SPURIOUS OPERATION	4	1	.00	.00	.00	.00	32.61	70	245	70	2
FALSE RESPONSE	4	3	.00	.00	.00	4.39	15.22	40	118	40	1
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	17.55	79	79	79	79
TOTAL	47	7	.00	.00	21.95	55.00	193.14	59	808	59	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ENGINES, INTERNAL COMBUSTION

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIESEL OR NO.2 FUEL OIL FOUR STROKE RECIPR, IN-LINE BLOCK	3	.002 .123	13	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	8.15	8.15	8.15	8.15	8.15	15	15	15	15
CRACK	1	1	8.15	8.15	8.15	8.15	8.15	10	10	10	10
PHYSICAL DISTORTION	1	1	8.15	8.15	8.15	8.15	8.15	26	26	26	26
FRACTURE/BREAK	2	1	16.30	16.30	16.30	16.30	16.30	180	262	180	98
WON'T START/MOVE	5	1	40.74	40.74	40.74	40.74	40.74	65	225	65	4
OUT OF ADJUSTMENT	1	1	8.15	8.15	8.15	8.15	8.15	9	9	9	9
FALSE RESPONSE	2	1	16.30	16.30	16.30	16.30	16.30	20	23	20	17
TOTAL	13	1	105.93	105.93	105.93	105.93	105.93	60	262	60	4

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIESEL OR NO.2 FUEL OIL FOUR STROKE RECIPR, V-BLOCK	42	.009 2.043	42	15	16

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	16	6	.00	.00	.00	.00	43.84	836	5383	836	2
CRACK	1	1	.00	.00	.00	.00	3.25	5400	5400	5400	5400
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	9.46	55	55	55	55
FRACTURE/BREAK	3	3	.00	.00	.00	.00	24.76	838	2328	838	42
WON'T START/MOVE	7	6	.00	.00	.00	.00	24.76	61	237	61	4
WON'T STOP	1	1	.00	.00	.00	.00	4.39	16	16	16	16
WON'T RELEASE	1	1	.00	.00	.00	.00	12.01	75	75	75	75
OUT OF LIMITS	7	4	.00	.00	.00	.00	28.53	394	1599	394	2
SPURIOUS OPERATION	3	2	.00	.00	.00	.00	18.91	216	240	216	168
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	49.52	6	6	6	6
TOTAL	42	11	.00	.00	.00	3.04	99.03	602	5400	602	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

ENGINES, INTERNAL COMBUSTION

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIESEL OR NO.2 FUEL OIL OTHER			2	--- / .061	2	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTURTION	1	1	16.44	16.44	16.44	16.44	16.44	11	11	11	11
WON'T START/MOVE	1	1	16.44	16.44	16.44	16.44	16.44	188	188	188	188
TOTAL	2	1	32.88	32.88	32.88	32.88	32.88	100	188	100	11

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

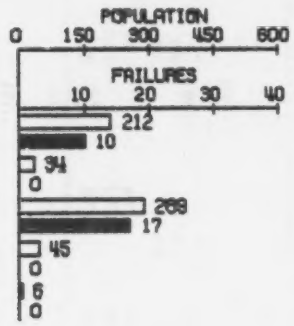
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD# 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

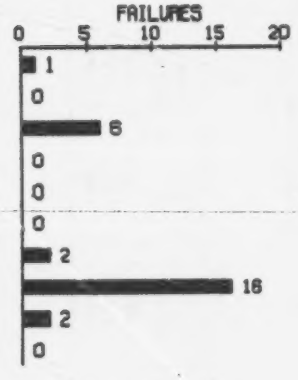
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FILTERS/STRAINERS	586	25.4315	27	1784	217	0

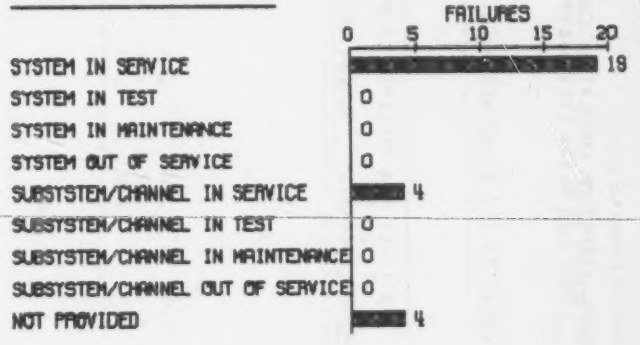
TYPE/CATEGORY



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FILTER

FAILURES

POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

FILTERS/STRAINERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GAS MECH. RESTRICTION, MESH/SCREEN						94		2.635 3.919			2		20			19
MVMT START/MOVE	1	1	.00	.00	.00	.00	12.01	358						358	358	358
OUT OF LIMITS	1	1	.00	.00	.00	.00	18.91	14						14	14	14
TOTAL	2	2	.00	.00	.00	.00	18.91	186						358	186	14
GAS MEMBRANE						7		— .300			0		3			3
GAS POROUS SOLID/LOOSE MATERIAL						99		1.907 4.384			7		33			23
LEAK	1	1	.00	.00	.00	.00	8.78	53						53	53	53
OUT OF LIMITS	6	4	.00	.00	.00	.00	8.78	240						722	240	0
TOTAL	7	5	.00	.00	.00	.00	8.78	213						722	213	0
GAS CHEMICAL/FLUID						2		.081 .081			0		1			1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

FILTERS/STRAINERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
GAS								4		.002	1	2	2			
GRAVITY/SETTLING										.149						
SPURIOUS OPERATION	1	1	.00	.00	6.00	12.01	12.01		53			53	53	53	53	53
TOTAL	1	1	.00	.00	6.00	12.01	12.01		53			53	53	53	53	53
GAS								6		.001	0	2	2			
OTHER										.225						
SOLID								9		.478	0	3	3			
MECH. RESTRICTION, MESH/SCREEN										.500						
SOLID								17		.272	0	4	2			
MEMBRANE										.897						
SOLID								7		.265	0	2	2			
POROUS SOLID/LOOSE MATERIAL										.318						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

FILTERS/STRAINERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SOLID UNDEFINED								.046	1		0	1	1			
								.055								
LIQUID MECH. RESTRICTION, MESH/SCREEN								4.869	187		13	47	30			
								7.974								
LEAK	4	2	.00	.00	.00	.00	6.84	384				1249	384	13		
FRACTURE/BREAK	8	2	.00	.00	.00	.00	17.54	291				1784	291	6		
MVMT HOLD	1	1	.00	.00	.00	.00	2.51	32				32	32	32		
TOTAL	13	4	.00	.00	.00	.00	20.05	299				1784	299	6		
LIQUID MEMBRANE								.336	33		0	9	9			
								1.301								
LIQUID POROUS SOLID/LOUSE MATERIAL								.723	22		0	9	8			
								.977								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

FILTERS/STRAINERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LIQUID CHEMICAL/FLUID								13	.327		3	3	3			
									.619							
OUT OF LIMITS	3	1	.00	.00	.00	19.56	19.56			3				4	3	2
TOTAL	3	1	.00	.00	.00	19.56	19.56			3				4	3	2
LIQUID OTHER								29	.828		1	10	9			
									1.423							
LEAK	1	1	.00	.00	.00	.00	3.62			51				51	51	51
TOTAL	1	1	.00	.00	.00	.00	3.62			51				51	51	51
LIQUID UNDEFINED								5	.062		0	3	2			
									.197							
OTHER MECH. RESTRICTION, MESH/SCREEN								29	1.232		0	3	3			
									1.254							

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

FILTERS/STRAINERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER POROUS SOLID/LOOSE MATERIAL	10	.417	0	2	2
		.427			
OTHER OTHER	6	.184	0	1	1
		.184			
UNDEFINED UNDEFINED	6	—	0	2	2
		.247			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER POROUS SOLID/LOOSE MATERIAL										
OTHER OTHER										
UNDEFINED UNDEFINED										

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

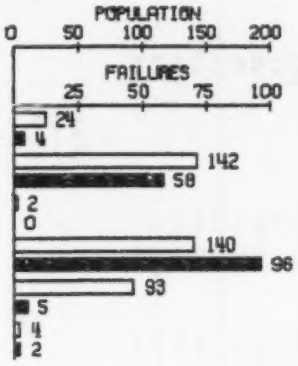
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

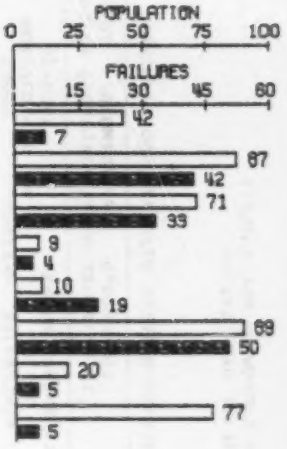
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GENERATORS	405	19.4162	165	4388	179	0

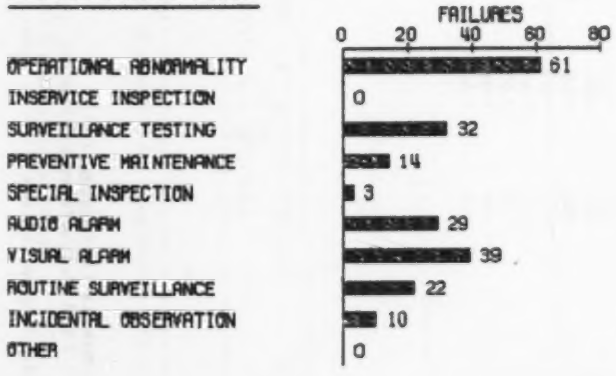
TYPE/CATEGORY



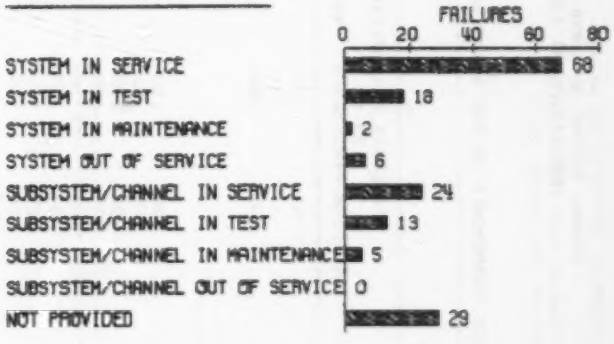
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES ■ POPULATION □

GENERA

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

GENERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ALTERNATOR ALTERNATING CURRENT	20	.404 .891	3	10	9

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	10.96	168	168	168	168
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	5.69	262	262	262	262
WON'T START/MOVE	1	1	.00	.00	.00	.00	10.10	726	726	726	726
TOTAL	3	3	.00	.00	.00	5.69	10.96	385	726	385	168

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ALTERNATOR VARIABLE FREQUENCY,AC	4	.183 .215	1	2	2

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SPURIOUS OPERATION	1	1	.00	.00	6.00	12.01	12.01	3	3	3	3
TOTAL	1	1	.00	.00	6.00	12.01	12.01	3	3	3	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRU REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

GENERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPROS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GENERATOR ALTERNATING CURRENT	118	1.695 5.463	53	47	37

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	5	4	.00	.00	.00	.00	18.33	568	2424	568	4
CRACK	1	1	.00	.00	.00	.00	9.51	17	17	17	17
PHYSICAL DISTURTION	4	3	.00	.00	.00	.00	9.13	175	681	175	3
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	9.46	55	55	55	55
COLLAPSE	1	1	.00	.00	.00	.00	10.86	56	56	56	56
FRACTURE/BREAK	3	2	.00	.00	.00	.00	11.70	19	32	19	2
MUN*T START/MOVE	12	9	.00	.00	.00	.00	15.01	123	1320	123	1
MUN*T STOP	2	1	.00	.00	.00	.00	18.25	661	898	661	424
MUN*T CLOSE	3	2	.00	.00	.00	.00	11.70	139	408	139	2
OUT OF LIMITS	10	7	.00	.00	.00	.00	18.91	137	1141	137	0
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	18.33	4	4	4	3
SPURIOUS OPERATION	5	3	.00	.00	.00	.00	18.33	696	3200	696	3
FALSE RESPONSE	3	2	.00	.00	.00	.00	18.91	29	48	28	3
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	5.85	110	110	110	110
TOTAL	53	19	.00	.00	4.08	13.16	73.33	226	3200	226	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GENERATOR DIRECT CURRENT	6	.240 .265	3	3	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	.00	6.09	6.09	10	10	10	10
OUT OF ADJUSTMENT	2	1	.00	.00	.00	50.94	50.94	686	1353	686	18
TOTAL	3	2	.00	.00	6.09	50.94	50.94	460	1353	460	10

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

GENERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GENERATOR VARIABLE FREQUENCY,AC	16	.493 .738	2	7	7

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	6.00	34	34	34	34
HUNT RUN	1	1	.00	.00	.00	.00	6.00	12	12	12	12
TOTAL	2	1	.00	.00	.00	.00	12.01	23	34	23	12

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GENERATOR UNDEFINED	2	.029 .057	0	1	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
AMPLIDYNE ALTERNATING CURRENT	2	-- .131	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

GENERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INVERTER ALTERNATING CURRENT	124	5.375 6.046	91	35	34

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	6.71	111	111	111	111
COLLAPSE	1	1	.00	.00	.00	9.17	69	69	69	69
FRACTURE/BREAK	6	2	.00	.00	.00	23.77	7	25	7	1
WON'T START/MOVE	3	2	.00	.00	.00	7.57	392	1169	392	4
WON'T CLOSE	2	1	.00	.00	.00	4.39	5	8	5	2
WON'T HOLD	2	2	.00	.00	.00	4.86	24	39	24	8
WON'T RELEASE	1	1	.00	.00	.00	3.78	23	23	23	23
OUT OF LIMITS	15	6	.00	.00	.00	35.18	90	632	90	0
OUT OF ADJUSTMENT	5	4	.00	.00	.00	15.22	137	485	137	2
SPURIOUS OPERATION	30	9	.00	.00	2.20	79.01	133	1135	133	0
FALSE RESPONSE	14	7	.00	.00	.00	43.90	82	755	82	0
ERRATIC OUTPUT	1	1	.00	.00	.00	7.61	72	72	72	72
OTHER (SEE REMARKS)	10	7	.00	.00	.00	26.34	118	736	118	0
TOTAL	91	17	.00	.00	2.19	26.33	158.02	109	1169	109	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INVERTER DIRECT CURRENT	16	.499 .500	5	4	4

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	3	1	.00	.00	.00	24.45	189	557	189	5
SPURIOUS OPERATION	1	1	.00	.00	.00	6.01	4368	4368	4368	4368
FALSE RESPONSE	1	1	.00	.00	.00	9.15	104	104	104	104
TOTAL	5	2	.00	.00	.00	3.00	32.60	1008	4368	1008	5

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER ALTERNATING CURRENT	12	.451 .644	4	5	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	4	1	.00	.00	.00	9.42	9.42	3	6	3	1
TOTAL	4	1	.00	.00	.00	9.42	9.42	3	6	3	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

GENERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
OTHER								81		2.674	1	6	1			
DIRECT CURRENT										4.260						
OUT OF LIMITS	1	1	.24	.24	.24	.24	.24				0	0	0	0	0	0
TOTAL	1	1	.24	.24	.24	.24	.24				0	0	0	0	0	0
UNDEFINED								2		.096	0	1	1			
ALTERNATING CURRENT										.114						
UNDEFINED								1		.001	0	1	1			
DIRECT CURRENT										.055						
UNDEFINED								1		.002	2	1	1			
VARIABLE FREQUENCY,AC										.037						
WON'T START/MOVE	1	1	26.83	26.83	26.83	26.83	26.83				47	47	47	47	47	47
WON'T CLOSE	1	1	26.83	26.83	26.83	26.83	26.83				31	31	31	31	31	31
TOTAL	2	1	53.67	53.67	53.67	53.67	53.67				39	47	39	31		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

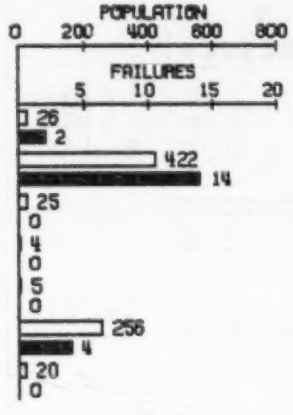
PLEASE REFER TO PAGE 251 FOR DESCRIPTION OF CALCULATION METHOD

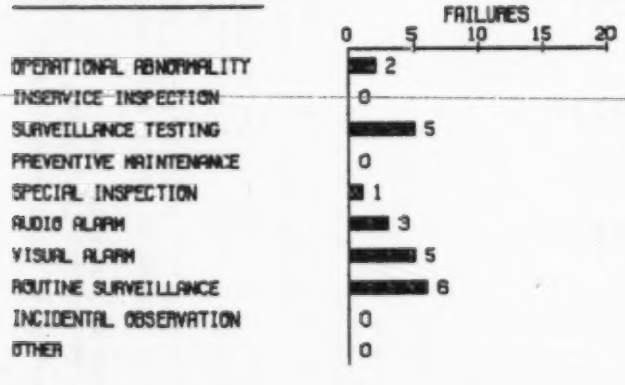
NPRD REPORT R03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

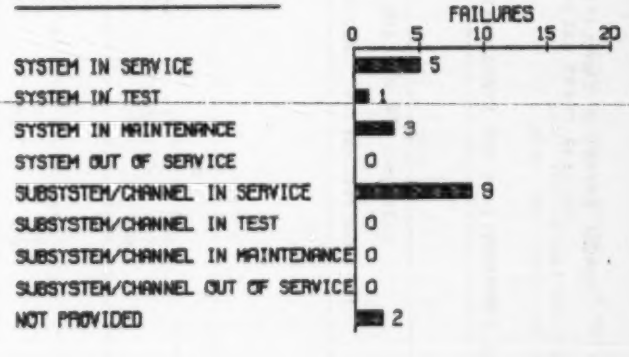
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
HEATERS, ELECTRIC	758	34.3237	20	482	72	4







HEATER

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEATERS, ELECTRIC

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS					
PRESSURIZER HEATER									26	.927	2	10	9
										1.299			
WON'T CLOSE	1	1	.00	.00	.00	.00	8.95	21					
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	3.51	4					
TOTAL	2	2	.00	.00	.00	.00	8.95	13					
HEAT TRACING									422	18.105	14	13	10
										18.502			
BREACH	2	1	.00	.00	.00	.00	.21	31					
FRACTURE/BREAK	4	2	.00	.00	.00	.00	1.10	78					
WON'T START/MOVE	2	1	.00	.00	.00	.00	.21	144					
OUT OF LIMITS	2	2	.00	.00	.00	.00	15.21	53					
OTHER (SEE REMARKS)	4	3	.00	.00	.00	.11	1.10	132					
TOTAL	14	4	.00	.00	.00	1.24	15.21	93					
ENGINE BLOCK HEATER									25	.530	0	4	4
										.984			
IMMERSION HEATER									4	.114	0	1	1
										.114			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEATERS, ELECTRIC

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TANK HEATER			5	.058	0	2	2
				.062			
OTHER			256	7.448	4	36	21
				12.595			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	13.15	48	48	48	48
FRACTURE/BREAK	1	1	.00	.00	.00	.00	1.37	8	8	8	8
FALSE RESPONSE	1	1	.00	.00	.00	.00	4.39	4	4	4	4
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.16	51	51	51	51
TOTAL	4	4	.00	.00	.00	.00	13.15	28	51	28	4

UNDEFINED											
			20	.507	0	3	2				
				.767							

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

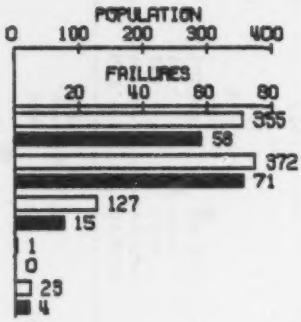
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

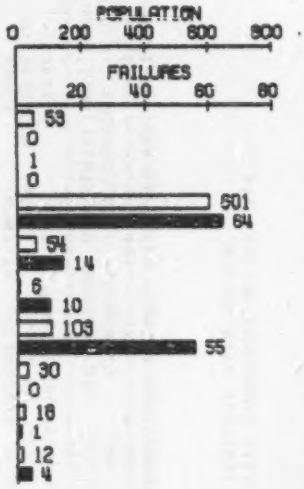
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
HEAT EXCHANGERS	878	41.4398	148	7007	473	0

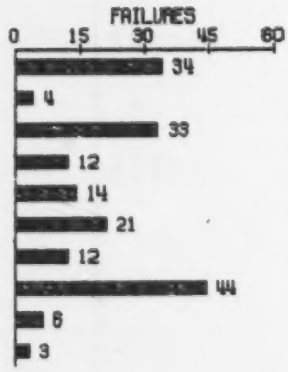
TYPE/CATEGORY



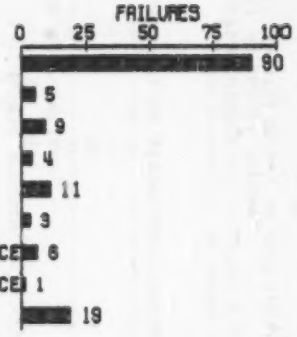
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 7/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEAT EXCHANGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
STRAIGHT TUBE HORIZONTAL SHELL AND TUBE			173	4.311	18	57	29
				8.428			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	6	3	.00	.00	.00	.00	5.09	1355	7007	1355	5
CRACK	2	1	.00	.00	.00	.00	3.32	14	22	14	5
WON'T START/MOVE	1	1	.00	.00	.00	.00	4.07	116	116	116	116
OUT OF LIMITS	5	1	.00	.00	.00	.00	5.42	5	7	5	5
BLOCKED OR STOPPED FL	3	1	.00	.00	.00	.00	3.25	20	20	20	20
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	1.08	9	9	9	9
TOTAL	18	4	.00	.00	.00	.00	14.08	465	7007	465	5

STRAIGHT TUBE VERTICAL SHELL AND TUBE	65	1.370	32	32	28
		3.324			

LEAK	29	8	.00	.00	.00	.00	178.60	303	3606	303	3
CRACK	1	1	.00	.00	.00	.00	9.46	26	26	26	26
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	9.01	197	197	197	197
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	9.46	36	227	227	227
TOTAL	32	9	.00	.00	.00	.00	178.60	289	3606	289	3

STRAIGHT TUBE SHELL AND CONCENTRIC TUBE	6	--	0	1	1
		.184			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEAT EXCHANGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
STRAIGHT TUBE SHELL AND MULTI-SECTION TUBE	7	.336 .339	0	3	3
STRAIGHT TUBE DIRECT CONTACT	15	.595 .733	0	6	6
STRAIGHT TUBE RADIATOR TYPE	89	2.515 4.033	8	16	12

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	6	3	.00	.00	.00	.00	15.78	690	1440	690	72
WON'T CLOSE	1	1	.00	.00	.00	.00	1.17	3460	3460	3460	3460
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.17	0	0	0	0
TOTAL	8	3	.00	.00	.00	.00	15.78	950	3460	950	0

U-TUBE HORIZONTAL SHELL AND TUBE	188	4.290 9.751	20	71	41

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	8	4	.00	.00	.00	.00	7.53	75	323	75	11
BREACH	2	2	.00	.00	.00	.00	2.19	13	23	13	3
PHYSICAL DISTORTION	6	1	.00	.00	.00	.00	13.17	14	65	14	2
OUT OF LIMITS	2	1	.00	.00	.00	.00	4.39	110	190	110	30
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	3.90	0	0	0	0
TOTAL	20	5	.00	.00	.00	.00	21.94	47	323	47	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEAT EXCHANGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
U-TUBE VERTICAL SHELL AND TUBE						166		4.839 / 8.255			45		65			39
LEAK	36	8	.00	.00	.00	.00	30.72	361						1116	361	48
CRACK	3	2	.00	.00	.00	.00	16.25	2522						3504	2522	558
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	8.12	117						117	117	117
PHYSICAL DISPLACEMENT	4	1	.00	.00	.00	.00	10.03	120						288	264	240
FALSE RESPONSE	1	1	.00	.00	.00	.00	4.13	5						5	5	5
TOTAL	45	10	.00	.00	.00	3.04	32.91	482						3504	483	5
U-TUBE SHELL AND MULTI-SECTION TUBE						3		.150 / .150			0		3			3
U-TUBE SHELL AND TUBE PLUS STEAM DRUM						11		.370 / .515			1		3			3
LEAK	1	1	.00	.00	.00	4.39	4.39	3						3	3	3
TOTAL	1	1	.00	.00	.00	4.39	4.39	3						3	3	3
U-TUBE RADIATOR TYPE						4		.164 / .228			5		1			1
LEAK	3	1	13.17	13.17	13.17	13.17	13.17	126						241	126	69
SPURIOUS OPERATION	2	1	8.78	8.78	8.78	8.78	8.78	125						137	125	113
TOTAL	5	1	21.95	21.95	21.95	21.95	21.95	126						241	126	69

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 7/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEAT EXCHANGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HELICAL COIL HORIZONTAL SHELL AND TUBE	30	.749	5	15	13
		1.513			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	4	3	.00	.00	.00	.00	18.02	4107	6632	4107	31
BREACH	1	1	.00	.00	.00	.00	7.13	32	32	32	32
TOTAL	5	3	.00	.00	.00	.00	18.02	3292	6632	3292	31

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HELICAL COIL VERTICAL SHELL AND TUBE	14	.559	0	4	4
		.612			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HELICAL COIL SHELL AND CONCENTRIC TUBE	25	.787	9	8	8
		1.165			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	9	2	.00	.00	.00	.00	32.60	40	80	40	5
TOTAL	9	2	.00	.00	.00	.00	32.60	40	80	40	5

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HELICAL COIL DIRECT CONTACT	1	.003	0	1	1
		.057			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEAT EXCHANGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS					
HELICAL COIL RADIATOR TYPE								1.601	45	1.637	0	8	5
HELICAL COIL OTHER								.178	12	.613	1	2	2
LEAK	1	1	.00	.00	.86	1.72	1.72	467					
TOTAL	1	1	.00	.00	.86	1.72	1.72	467					
OTHER DIRECT CONTACT								--	1	.057	0	1	1
UNDEFINED HORIZONTAL SHELL AND TUBE								.056	3	.099	4	2	2
LEAK	4	1	.00	.00	32.56	65.13	65.13	1053					
TOTAL	4	1	.00	.00	32.56	65.13	65.13	1053					

OUT-OF-SERVICE HOURS		
HIGHEST	AVERAGE	LOWEST
	8	5
	2	2
467	467	467
467	467	467
	1	1
2016	1053	176
2016	1053	176

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

HEAT EXCHANGERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED VERTICAL SHELL AND TUBE	2	.088	0	1	1
		.088			
UNDEFINED SHELL AND CONCENTRIC TUBE	4	--	0	1	1
		.114			
UNDEFINED OTHER	3	.069	0	2	2
		.153			
UNDEFINED UNDEFINED	11	.124	0	3	3
		.395			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
UNDEFINED VERTICAL SHELL AND TUBE											
UNDEFINED SHELL AND CONCENTRIC TUBE											
UNDEFINED OTHER											
UNDEFINED UNDEFINED											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

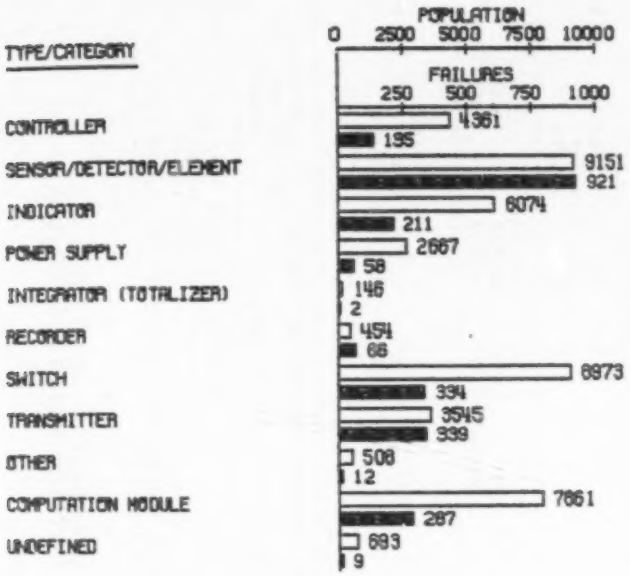
PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

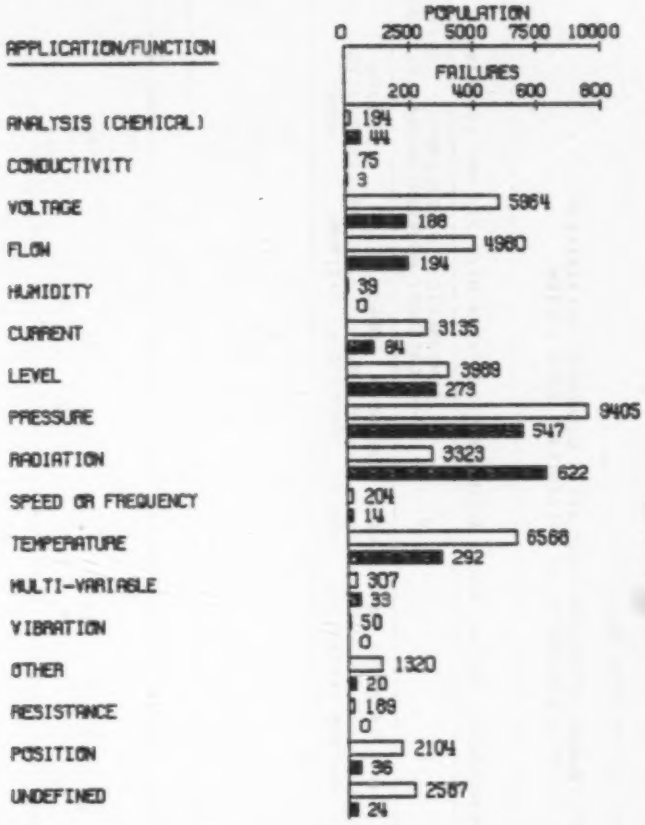
NPRD REPORT R03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

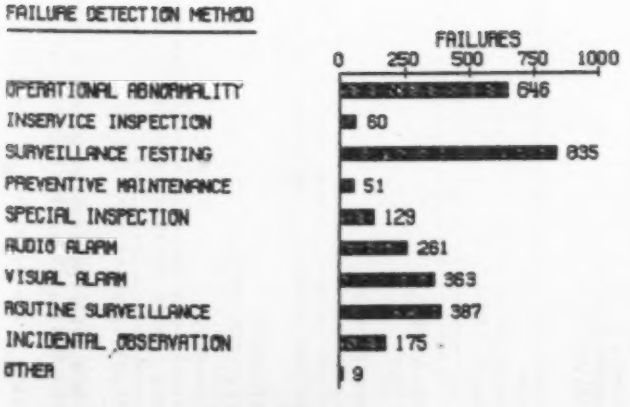
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

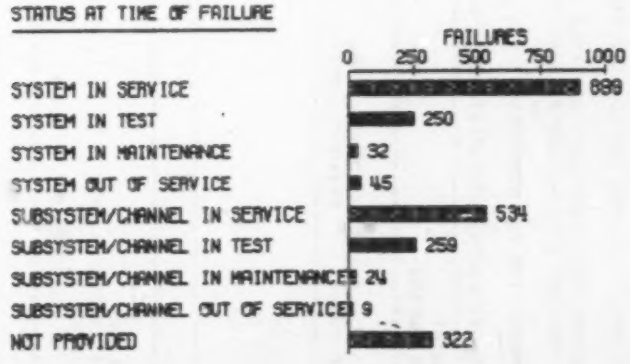
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INSTRUMENTATION AND CONTROLS	44433	1983.3754	2374	8845	352	0









FAILURES POPULATION

INSTRU

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPROS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
CONTROLLER DIAPHRAM								1.548	48		0	12	10			
								1.915								
CONTROLLER BELLOWS								.370	12		0	2	2			
								.391								
CONTROLLER BOURDON TUBE								.168	6		1	4	4			
								.274								
COLLAPSE	1	1	.00	.00	.00	.00	32.60	648						648	648	648
TOTAL	1	1	.00	.00	.00	.00	32.60	648						648	648	648
CONTROLLER ORIFICE								.120	14		0	4	2			
								.489								
CONTROLLER RESISTANCE CHANGE								.069	7		0	2	2			
								.408								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROLLER FLOAT								.202	8		2	2	2
								.246					
OUT OF LIMITS	1	1	.00	.00	7.92	15.84	15.84	43			43	43	43
OUT OF ADJUSTMENT	1	1	.00	.00	7.92	15.84	15.84	3			3	3	3
TOTAL	2	1	.00	.00	15.84	31.69	31.69	23			43	23	3
CONTROLLER PHOTOELECTRIC								.057	1		0	1	1
								.057					
CONTROLLER FILLED LIQUID OR GAS								.614	14		0	4	4
								.677					
CONTROLLER BIMETALLIC								.083	2		0	2	2
								.086					
CONTROLLER POTENTIOMETIC								.267	8		0	3	3
								.272					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROLLER IRON VANE			2	.001	1	1	1
				.114			
OTHER (SEE REMARKS)	1	1			3	3	3
TOTAL	1	1			3	3	3
CONTROLLER MECHANICAL			1	.029	0	1	1
				.029			
CONTROLLER AMPLIFIER			23	.898	10	5	4
				1.181			
WON'T HOLD	1	1			127	127	127
WON'T RELEASE	1	1			6	6	6
OUT OF LIMITS	1	1			2	2	2
OUT OF ADJUSTMENT	4	1			7	10	7
SPURIOUS OPERATION	1	1			7	7	7
FALSE RESPONSE	2	1			22	38	22
TOTAL	10	1			21	127	21
CONTROLLER E-P CONVERTER			11	.171	0	4	3
				.488			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER (SEE REMARKS)	1	1	8.78	8.78	8.78	8.78	8.78	3	3	3
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78	3	3	3
WON'T HOLD	1	1	.00	.00	.00	.00	1.11	127	127	127
WON'T RELEASE	1	1	.00	.00	.00	.00	1.11	6	6	6
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.11	2	2	2
OUT OF ADJUSTMENT	4	1	.00	.00	.00	.00	4.45	7	10	7
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.11	7	7	7
FALSE RESPONSE	2	1	.00	.00	.00	.00	2.23	22	38	22
TOTAL	10	1	.00	.00	.00	.00	11.13	21	127	21

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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CONTROLLER MV-I CONVERTER								2		.091	2	1	1			
										.091						
OUT OF LIMITS	2	1	22.02	22.02	22.02	22.02	22.02			228				336	228	120
TOTAL	2	1	22.02	22.02	22.02	22.02	22.02			228				336	228	120
CONTROLLER I-I CONVERTER								1		--	0	1	1			
										.057						
CONTROLLER SUMMER								8		.298	0	1	1			
										.298						
CONTROLLER FUNCTION GENERATOR								4		.228	0	1	1			
										.228						
CONTROLLER MULTI-FUNCTION GENERATOR								1		.057	0	1	1			
										.057						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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			MINIMUM								OUT-OF-SERVICE HOURS HIGHEST AVERAGE LOWEST	
CONTROLLER E-E CONVERTER							5		.179 / .190	0	1	1
CONTROLLER I-E CONVERTER							6		.132 / .245	0	2	2
CONTROLLER OTHER							65		3.487 / 3.505	1	5	5
OUT OF LIMITS	1	1	.00	.00	.00	5.05			1061		1061 1061 1061	
TOTAL	1	1	.00	.00	.00	5.05			1061		1061 1061 1061	
CONTROLLER MICRO							7		.290 / .371	0	4	4
CONTROLLER SOLID STATE							184		10.186 / 10.394	0	6	6

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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			MINIMUM						OUT-OF-SERVICE HOURS HIGHEST AVERAGE LOWEST	
CONTROLLER PNEUMATIC-PROPORTIONAL					301		8.762	1	32	13
							10.803			
SPURIOUS OPERATION	1	1	.00	.00	.00	1.76	2	2	2	2
TOTAL	1	1	.00	.00	.00	1.76	2	2	2	2
CONTROLLER PNEUMATIC-ON-OFF					149		6.574	4	31	12
							7.744			
WON'T CLOSE	1	1	.00	.00	.00	.73	8	8	8	8
WON'T OPEN	1	1	.00	.00	.00	.73	1276	1276	1276	1276
FALSE RESPONSE	2	1	.00	.00	.00	3.19	352	673	352	30
TOTAL	4	2	.00	.00	.00	3.19	497	1276	497	8
CONTROLLER PNEUMATIC-OTHER					73		3.016	0	18	10
							3.600			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROLLER ELECTRONIC-PROPORTIONAL	521	21.611 / 25.803	37	116	40

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	5	5	.00	.00	.00	.00	22.74	35	70	35	6
WON'T CLOSE	1	1	.00	.00	.00	.00	.66	1	1	1	1
OUT OF LIMITS	13	6	.00	.00	.00	.00	17.55	749	5069	749	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.76	4	4	4	4
SPURIOUS OPERATION	4	2	.00	.00	.00	.00	1.05	1042	2284	1042	3
FALSE RESPONSE	9	4	.00	.00	.00	.00	2.34	173	815	173	7
WON'T TURN AT SPEED	1	1	.00	.00	.00	.00	8.32	3	3	3	3
WON'T RESPOND	1	1	.00	.00	.00	.00	12.01	5	5	5	5
SHORT TO PIN	1	1	.00	.00	.00	.00	2.61	1	1	1	1
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	4.39	326	326	326	326
TOTAL	37	19	.00	.00	.00	.00	22.74	432	5069	432	1

CONTROLLER ELECTRONIC-ON-OFF	2410	111.418 / 125.116	62	117	42

PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.41	1339	1339	1339	1339
WON'T START/MOVE	4	3	.00	.00	.00	.00	8.78	432	1513	432	25
WON'T HOLD	1	1	.00	.00	.00	.00	.11	144	144	144	144
OUT OF LIMITS	28	8	.00	.00	.00	.00	1.46	160	1361	171	0
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.58	438	438	438	438
SPURIOUS OPERATION	15	8	.00	.00	.00	.00	17.56	105	1045	105	1
FALSE RESPONSE	10	7	.00	.00	.00	.00	8.78	90	384	90	1
DRIFT	1	1	.00	.00	.00	.00	.49	312	312	312	312
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.11	2	2	2	2
TOTAL	62	14	.00	.00	.00	.32	35.12	176	1513	181	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROLLER ELECTRONIC-OTHER			148	5.890 6.332	7	24	14

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	2	2	.00	.00	.00	.00	19.01	3	4	3	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	3.51	206	206	206	206
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	7.02	582	725	582	438
FALSE RESPONSE	2	1	.00	.00	.00	.00	7.02	393	412	393	374
TOTAL	7	3	.00	.00	.00	.00	19.01	309	725	309	1

CONTROLLER OTHER			33	1.015 1.301	2	7	5

PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	1.59	6	6	6	6
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	25.87	31	31	31	31
TOTAL	2	2	.00	.00	.00	1.59	25.87	19	31	19	6

CONTROLLER OTHER			7	.269 .281	1	2	2

OUT OF LIMITS	1	1	.00	.00	8.77	17.55	17.55	7	7	7	7
TOTAL	1	1	.00	.00	8.77	17.55	17.55	7	7	7	7

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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CONTROLLER UNDEFINED			279	8.553	4	27	15
				11.196			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	2	2	.00	.00	.00	17.55	4	5	4	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.38	32	32	32	32
FALSE RESPONSE	1	1	.00	.00	.00	.80	20	20	20	20
TOTAL	4	4	.00	.00	.00	.38	17.55	15	32	15

SENSOR/DETECTOR/ELEMENT DIAPHRAM										
			588			27.659	56	85		25
						32.104				
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.73	6	6	6	6
WON'T CLOSE	1	1	.00	.00	.00	.00	.49	24	24	24	24
OUT OF LIMITS	44	10	.00	.00	.00	1.99	5.01	448	7418	448	0
OUT OF ADJUSTMENT	5	3	.00	.00	.00	.00	2.07	35	170	35	0
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.18	1704	1704	1704	1704
FALSE RESPONSE	3	3	.00	.00	.00	.00	.85	231	526	231	0
DRIFT	1	1	.00	.00	.00	.00	1.03	1	1	1	1
TOTAL	56	12	.00	.00	.00	2.03	6.69	398	7418	398	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SENSOR/DETECTOR/ELEMENT BELLOWS	1035	33.254 56.384	68	92	28

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	3	3	.00	.00	.00	.00	4.39	349	790	349	11
WON'T START/MOVE	1	1	.00	.00	.00	.00	.50	26	26	26	26
WON'T CLOSE	2	2	.00	.00	.00	.00	.59	18	26	18	10
WON'T OPEN	1	1	.00	.00	.00	.00	.39	17	17	17	17
OUT OF LIMITS	34	10	.00	.00	.00	.00	5.70	94	183	94	0
OUT OF ADJUSTMENT	9	3	.00	.00	.00	.00	2.32	913	4102	913	1
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	.53	43	81	43	4
FALSE RESPONSE	15	7	.00	.00	.00	.00	3.43	1772	7516	1772	2
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.27	2913	2913	2913	2913
TOTAL	68	17	.00	.00	.00	.00	7.10	619	7516	619	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SENSOR/DETECTOR/ELEMENT BOURDON TUBE	661	30.963 36.918	80	82	16

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.33	0	0	0	0
CRACK	1	1	.00	.00	.00	.00	.33	189	189	189	189
PHYSICAL DISTORTION	7	1	.00	.00	.00	.00	.89	765	3966	765	2
WON'T CLOSE	1	1	.00	.00	.00	.00	.13	0	0	0	0
WON'T OPEN	1	1	.00	.00	.00	.00	.33	364	364	364	364
WON'T HOLD	1	1	.00	.00	.00	.00	.13	77	77	77	77
OUT OF LIMITS	51	5	.00	.00	.00	.00	5.69	85	2882	85	0
OUT OF ADJUSTMENT	10	3	.00	.00	.00	.00	2.34	780	3845	780	0
SPURIOUS OPERATION	6	1	.00	.00	.00	.00	.76	2478	8645	2478	2
FALSE RESPONSE	1	1	.00	.00	.00	.00	.33	93	93	93	93
TOTAL	80	6	.00	.00	.00	.00	5.85	413	8645	413	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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SENSOR/DETECTOR/ELEMENT MANOMETER			15	.753 .807	0	5	3
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	18.26 18.26	18.26	18.26	18.26	1	1	1	1
OUT OF ADJUSTMENT	1	1	18.26 18.26	18.26	18.26	18.26	4	4	4	4
TOTAL	2	1	36.52 36.52	36.52	36.52	36.52	3	4	3	1
SENSOR/DETECTOR/ELEMENT ULTRASONIC			1	.055 .055	2	1	1
OUT OF LIMITS	1	1	18.26 18.26	18.26	18.26	18.26	1	1	1	1
OUT OF ADJUSTMENT	1	1	18.26 18.26	18.26	18.26	18.26	4	4	4	4
TOTAL	2	1	36.52 36.52	36.52	36.52	36.52	3	4	3	1
SENSOR/DETECTOR/ELEMENT HELIX			77	1.931 3.924	4	11	6
OUT OF LIMITS	1	1	.00 .00	.00	.00	9.39	23	23	23	23
OUT OF ADJUSTMENT	2	1	.00 .00	.00	.00	18.33	71	71	71	71
FALSE RESPONSE	1	1	.00 .00	.00	.00	9.17	1416	1416	1416	1416
TOTAL	4	2	.00 .00	.00	9.39	27.50	395	1416	395	23
SENSOR/DETECTOR/ELEMENT CONDUCTANCE			24	1.082 1.097	3	13	10
LEAK	1	1	.00 .00	.00	.00	5.85	334	334	334	334
SPURIOUS OPERATION	1	1	.00 .00	.00	.00	5.85	4155	4155	4155	4155
FALSE RESPONSE	1	1	.00 .00	.00	.00	5.85	5735	5735	5735	5735
TOTAL	3	1	.00 .00	.00	.00	17.55	3408	5735	3408	334

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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SENSOR/DETECTOR/ELEMENT TURBINE			3	.106	1	2	2
				.167			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISPLACEMENT	1	1	.00	.00	9.45	18.91	18.91	46	46	46	46
TOTAL	1	1	.00	.00	9.45	18.91	18.91	46	46	46	46

SENSOR/DETECTOR/ELEMENT PADDLE/TARGET			36	1.859	1	15	10
				1.989			
OUT OF LIMITS	1	1	.00	.00	.00	.00	4.39	416	416	416	416
TOTAL	1	1	.00	.00	.00	.00	4.39	416	416	416	416

SENSOR/DETECTOR/ELEMENT ORIFICE			276	9.020	5	90	26
				12.785			
FALSE RESPONSE	5	2	.00	.00	.00	.00	5.04	283	352	283	6
TOTAL	5	2	.00	.00	.00	.00	5.04	283	352	283	6

SENSOR/DETECTOR/ELEMENT NOZZLE			93	3.882	5	28	17
				4.782			
CRACK	3	1	.00	.00	.00	.00	13.69	316	362	316	224
FALSE RESPONSE	2	1	.00	.00	.00	.00	9.13	142	142	142	142
TOTAL	5	1	.00	.00	.00	.00	22.82	246	362	246	142

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE / MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SENSOR/DETECTOR/ELEMENT VENTURI TUBE			47	1.598 / 2.218	0	16	12
OUT OF LIMITS	1	1	.00	.00	.00 / .00 / 2.17	361	361	361	361
SPURIOUS OPERATION	1	1	.00	.00	.00 / .00 / 23.12	1	1	1	1
FALSE RESPONSE	4	2	.00	.00	.00 / 2.17 / 48.05	4	9	4	2
TOTAL	6	3	.00	3.26	3.26 / 14.82 / 48.05	63	361	63	1
SENSOR/DETECTOR/ELEMENT POSITIVE DISPLACEMENT			15	.936 / .944	6	7	4
SENSOR/DETECTOR/ELEMENT HOT WIRE FLOWMETER			3	.024 / .171	0	1	1
SENSOR/DETECTOR/ELEMENT PITOT TUBE			74	2.801 / 2.829	0	6	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SENSOR/DETECTOR/ELEMENT RESISTANCE CHANGE									1076	45.923	43	105	45			
										51.785						
WON'T CLOSE	1	1	.00	.00	.00	.00	.74	128						128	128	128
OUT OF LIMITS	14	9	.00	.00	.00	.00	4.36	60						191	67	6
SPURIOUS OPERATION	7	3	.00	.00	.00	.00	3.16	619						1301	619	15
FALSE RESPONSE	21	9	.00	.00	.00	.00	3.55	833						5085	833	0
TOTAL	43	14	.00	.00	.00	.81	4.73	532						5085	532	0
SENSOR/DETECTOR/ELEMENT FLOAT									491	6.591	12	31	10			
										27.768						
PHYSICAL DISTORTION	3	1	.00	.00	.00	.00	.76	610						698	610	433
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.60	3						3	3	3
SPURIOUS OPERATION	3	1	.00	.00	.00	.00	.76	4241						6768	4241	1247
FALSE RESPONSE	4	2	.00	.00	.00	.00	3.10	183						678	183	3
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.25	2						2	2	2
TOTAL	12	3	.00	.00	.00	1.60	3.10	1274						6768	1274	2
SENSOR/DETECTOR/ELEMENT DIELECTRIC/CAPACITIVE									4	.075	0	1	1			
										.075						
SENSOR/DETECTOR/ELEMENT NUCLEAR GAGE									4	.203	0	1	1			
										.211						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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SENSOR/DETECTOR/ELEMENT PIEZOELECTRIC			10	.445 .454	0	3	2
SENSOR/DETECTOR/ELEMENT STRAIN GAGE/RESISTANCE			8	.323 .323	0	1	1
SENSOR/DETECTOR/ELEMENT SCINTILLATION			178	6.835 7.522	181	32	22

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
LEAK	3	1	.00	.00	.00	.00	2.44	8	8	8	8
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	1.01	74	74	74	74
PHYSICAL DISPLACEMENT	4	2	.00	.00	.00	.00	2.44	326	350	326	254
COLLAPSE	3	1	.00	.00	.00	.00	2.44	2302	2302	2302	2302
FRACTURE/BREAK	1	1	.00	.00	.00	.00	1.01	1	1	1	1
WON'T START/MOVE	88	5	.00	.00	.00	.00	66.81	302	1344	302	1
WON'T CLOSE	2	1	.00	.00	.00	.00	1.63	3	3	3	3
WON'T HOLD	1	1	.00	.00	.00	.00	1.01	12	12	12	12
OUT OF LIMITS	15	6	.00	.00	.00	2.02	19.01	73	210	73	1
OUT OF ADJUSTMENT	14	5	.00	.00	.00	.00	26.31	163	964	163	0
SPURIOUS OPERATION	24	6	.00	.00	.00	1.01	38.02	143	445	143	1
FALSE RESPONSE	19	6	.00	.00	.00	2.54	19.01	132	1206	132	1
OTHER (SEE REMARKS)	6	1	.00	.00	.00	.00	4.89	23	25	23	20
TOTAL	181	11	.00	.00	1.27	15.22	104.29	245	2302	245	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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SENSOR/DETECTOR/ELEMENT GEIGER-MULLER			159	5.739 6.389	42	32	25

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	3.11	40	40	40	40
OUT OF LIMITS	9	5	.00	.00	.00	.00	32.60	418	2211	418	0
OUT OF ADJUSTMENT	4	3	.00	.00	.00	.00	10.14	53	97	53	16
SPURIOUS OPERATION	6	4	.00	.00	.00	.00	7.61	37	125	37	4
FALSE RESPONSE	18	6	.00	.00	.00	.00	17.56	292	1188	292	1
OTHER (SEE REMARKS)	4	2	.00	.00	.00	.00	15.15	37	48	37	5
TOTAL	42	12	.00	.00	.00	7.61	32.60	230	2211	230	0

SENSOR/DETECTOR/ELEMENT ION CHAMBER,COMPENSATED			194	7.748 9.142	30	27	25

PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	4.39	4542	4542	4542	4542
FRACTURE/BREAK	1	1	.00	.00	.00	.00	2.82	31	31	31	31
WON'T START/MOVE	1	1	.00	.00	.00	.00	2.82	4	4	4	4
OUT OF LIMITS	4	3	.00	.00	.00	.00	9.51	200	708	200	2
OUT OF ADJUSTMENT	5	4	.00	.00	.00	.00	3.51	91	247	91	1
SPURIOUS OPERATION	10	3	.00	.00	.00	.00	14.10	77	213	77	24
FALSE RESPONSE	7	5	.00	.00	.00	.00	5.64	740	3382	740	5
DRIFT	1	1	.00	.00	.00	.00	1.90	2	2	2	2
TOTAL	30	9	.00	.00	.00	2.18	33.85	393	4542	393	1

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SENSOR/DETECTOR/ELEMENT ION CHAMBER,UNCOMPENSATED	324	13.447 19.735	46	38	34

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	5	3	.00	.00	.00	.00	4.68	984	3433	984	4
OUT OF LIMITS	11	5	.00	.00	.00	.00	7.02	121	364	121	2
OUT OF ADJUSTMENT	6	4	.00	.00	.00	.00	4.72	45	206	45	1
SPURIOUS OPERATION	9	6	.00	.00	.00	.00	5.27	39	149	52	1
FALSE RESPONSE	14	5	.00	.00	.00	.00	14.05	562	4121	562	2
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	1.76	817	817	817	817
TOTAL	46	11	.00	.00	.00	2.19	29.85	338	4121	341	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SENSOR/DETECTOR/ELEMENT FISSION CHAMBER	841	28.517 33.076	171	24	18

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.22	1060	1060	1060	1060
BREACH	51	1	.00	.00	.00	.00	6.84	587	3840	601	0
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	2.74	816	816	816	816
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.22	340	340	340	340
WON'T START/MOVE	1	1	.00	.00	.00	.00	2.74	24	24	24	24
WON'T STOP	1	1	.00	.00	.00	.00	.90	624	624	624	624
WON'T HOLD	1	1	.00	.00	.00	.00	.22	1586	1586	1586	1586
OUT OF LIMITS	17	3	.00	.00	.00	.00	13.17	1393	4944	1393	0
OUT OF ADJUSTMENT	8	4	.00	.00	.00	.00	1.60	646	3030	646	1
SPURIOUS OPERATION	23	7	.00	.00	.00	1.61	17.56	1560	6432	1560	4
FALSE RESPONSE	60	9	.00	.00	.17	3.00	17.56	1535	7872	1535	0
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	.80	14	14	14	14
HIGH OUTPUT	1	1	.00	.00	.00	.00	.80	2	2	2	2
INTERMITTANT	1	1	.00	.00	.00	.00	.13	464	464	464	464
OF INSULATION DAMAGE	1	1	.00	.00	.00	.00	.13	3	3	3	3
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	1.17	2	3	2	1
TOTAL	171	13	.00	.00	2.15	4.00	35.12	1125	7872	1125	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS					
SENSOR/DETECTOR/ELEMENT THERMOPILE									16	.268	0	5	5
										.552			
SENSOR/DETECTOR/ELEMENT SELF-ENG./S.S.NEUTRON DETECTOR									380	14.181	0	5	5
										17.149			
SENSOR/DETECTOR/ELEMENT FILLED LIQUID OR GAS									118	4.013	19	24	12
										6.422			
FRACTURE/BREAK	2	1	.00	.00	.00	.00	.56	1034				2034	1034	34
OUT OF LIMITS	3	2	.00	.00	.00	.00	3.53	86				168	86	42
SPURIOUS OPERATION	4	3	.00	.00	.00	.00	13.15	495				1665	495	24
FALSE RESPONSE	10	4	.00	.00	.00	.00	16.34	548				4684	548	5
TOTAL	19	6	.00	.00	.00	.00	19.61	515				4684	515	5
SENSOR/DETECTOR/ELEMENT BIMETALLIC									288	13.566	48	34	12
										15.765			
WON'T CLOSE	1	1	.00	.00	.00	.00	.21	456				456	456	456
OUT OF LIMITS	32	4	.00	.00	.00	.00	17.55	197				1416	214	2
OUT OF ADJUSTMENT	15	3	.00	.00	.00	.00	6.04	1				5040	1009	1
TOTAL	48	4	.00	.00	.00	.00	18.28	141				5040	467	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SENSOR/DETECTOR/ELEMENT THERMOCOUPLE									1145		35			98		26
								43.101								
								50.212								
LEAK	9	2	.00	.00	.00	.00	.84	376						1654	376	216
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.44	8						8	8	8
FRACTURE/BREAK	2	1	.00	.00	.00	.00	1.30	439						439	439	439
WON'T CLOSE	1	1	.00	.00	.00	.00	.11	23						23	23	23
OUT OF LIMITS	13	4	.00	.00	.00	.00	17.56	64						477	64	1
FALSE RESPONSE	9	2	.00	.00	.00	.00	.86	87						296	87	28
TOTAL	35	7	.00	.00	.00	.86	17.56	169						1654	169	1
SENSOR/DETECTOR/ELEMENT THERMISTOR									32		0			10		10
								1.295								
								1.555								
SENSOR/DETECTOR/ELEMENT POTENTIOMETIC									7		2			4		4
								.133								
								.387								
WON'T START/MOVE	1	1	.00	.00	.00	.00	4.39	3						3	3	3
FALSE RESPONSE	1	1	.00	.00	.00	.00	15.21	8						8	8	8
TOTAL	2	2	.00	.00	.00	2.19	15.21	6						8	6	3
SENSOR/DETECTOR/ELEMENT HYGROSCOPIC									4		0			1		1
								.228								
								.228								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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SENSOR/DETECTOR/ELEMENT ION EXCHANGE			3	.125 .125	0	2	2
SENSOR/DETECTOR/ELEMENT OTHER			147	5.342 6.755	9	19	10
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T HOLD	1	1	.00	.00	.00	.00	.76	91	91	91	91
OUT OF LIMITS	1	1	.00	.00	.00	.00	18.33	16	16	16	16
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	.76	40	53	40	26
FALSE RESPONSE	4	2	.00	.00	.00	.00	55.00	30	99	30	3
HIGH OUTPUT	1	1	.00	.00	.00	.00	7.45	10	10	10	10
TOTAL	9	4	.00	.00	.00	1.51	73.33	35	99	35	3
SENSOR/DETECTOR/ELEMENT D'ARSONVAL GALVANOMETER(MILLIV.)			22	.880 .999	0	9	8
SENSOR/DETECTOR/ELEMENT MECHANICAL			16	.840 .902	0	4	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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SENSOR/DETECTOR/ELEMENT					
OTHER	1	.012	1	1	1
		.039			
PHYSICAL DISTORTION	1	25.45	1	1	1
TOTAL	1	25.45	1	1	1
SENSOR/DETECTOR/ELEMENT					
E-P CONVERTER	1	.047	0	1	1
		.047			
SENSOR/DETECTOR/ELEMENT					
I-I CONVERTER	1	.033	0	1	1
		.044			
SENSOR/DETECTOR/ELEMENT					
AVERAGER	2	.095	1	2	2
		.097			
OUT OF ADJUSTMENT	1	25.06	1	1	1
TOTAL	1	25.06	1	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	25.45	25.45	25.45	25.45	25.45	2521	2521	2521	2521
TOTAL	1	1	25.45	25.45	25.45	25.45	25.45	2521	2521	2521	2521
OUT OF ADJUSTMENT	1	1	.00	.00	12.53	25.06	25.06	147	147	147	147
TOTAL	1	1	.00	.00	12.53	25.06	25.06	147	147	147	147

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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SENSOR/DETECTOR/ELEMENT FUNCTION GENERATOR	3	--	0	1	1
		.100			
SENSOR/DETECTOR/ELEMENT SQUARE-ROOT CONVERTER	1	.057	0	1	1
		.057			
SENSOR/DETECTOR/ELEMENT I-E CONVERTER	1	.022	0	1	1
		.031			
SENSOR/DETECTOR/ELEMENT OTHER	5	.236	0	1	1
		.236			
SENSOR/DETECTOR/ELEMENT MICRO	24	1.195	4	7	5
		1.321			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
OUT OF LIMITS	3	1	.00	.00	.00	.00	8.78	10	24	10	3
FALSE RESPONSE	1	1	.00	.00	.00	.00	22.76	13	13	13	13
TOTAL	4	2	.00	.00	.00	8.78	22.76	11	24	11	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SENSOR/DETECTOR/ELEMENT MERCURY								.230	7	1	1
								.228			
PHYSICAL DISPLACEMENT	1	1	4.39	4.39	4.39	4.39	4.39	2	2	2	2
WON'T START/MOVE	4	1	17.56	17.56	17.56	17.56	17.56	3	4	3	0
OUT OF LIMITS	2	1	8.78	8.78	8.78	8.78	8.78	4	4	4	3
TOTAL	7	1	30.72	30.72	30.72	30.72	30.72	3	4	3	0
SENSOR/DETECTOR/ELEMENT REED								2.287	2	3	2
								2.700			
WON'T OPEN	2	1	.00	.00	.41	.82	.82	1	2	1	0
TOTAL	2	1	.00	.00	.41	.82	.82	1	2	1	0
SENSOR/DETECTOR/ELEMENT SOLID STATE								.591	3	5	4
								.595			
OUT OF LIMITS	1	1	.00	.00	.00	.00	20.20	1	1	1	1
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	60.86	14	25	14	2
TOTAL	3	2	.00	.00	.00	10.10	60.86	9	25	9	1
SENSOR/DETECTOR/ELEMENT OTHER								.033	1	1	1
								.044			
OUT OF ADJUSTMENT	1	1	22.76	22.76	22.76	22.76	22.76	5	5	5	5
TOTAL	1	1	22.76	22.76	22.76	22.76	22.76	5	5	5	5

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	AVERAGE RESTORATION HOURS	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SENSOR/DETECTOR/ELEMENT PNEUMATIC-PROPORTIONAL							1		0	.057	1	1			
										.057					
SENSOR/DETECTOR/ELEMENT ELECTRONIC-PROPORTIONAL							2		0	.114	2	2			
										.114					
SENSOR/DETECTOR/ELEMENT GALVONOMETER TYPE							1		0	.057	1	1			
										.057					
SENSOR/DETECTOR/ELEMENT OTHER							17		1	.036	3	3			
										.687					
SPURIOUS OPERATION	1	1	.00	.00	.00	18.91	18.91		44		44	44	44	44	44
TOTAL	1	1	.00	.00	.00	18.91	18.91		44		44	44	44	44	44

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SENSOR/DETECTOR/ELEMENT					
UNDEFINED	572	17.159	32	66	26
		24.109			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	.18	248	248	248	248
OUT OF LIMITS	23	5	.00	.00	.00	.00	9.45	129	2449	129	0
OUT OF ADJUSTMENT	3	3	.00	.00	.00	.00	2.54	4	8	4	1
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.91	60	60	60	60
FALSE RESPONSE	2	2	.00	.00	.00	.00	2.51	749	1324	749	174
DRIFT	1	1	.00	.00	.00	.00	.68	1	1	1	1
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	2.02	1249	1249	1249	1249
TOTAL	32	8	.00	.00	.00	.32	10.80	189	2449	189	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDICATOR					
DIAPHRAM	94	3.799	10	23	15
		4.096			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
WON'T START/MOVE	2	1	.00	.00	.00	.00	3.51	4	7	4	1
OUT OF LIMITS	5	3	.00	.00	.00	.00	17.57	445	1079	445	8
OUT OF ADJUSTMENT	3	1	.00	.00	.00	.00	5.15	91	261	91	4
TOTAL	10	3	.00	.00	.00	.00	17.57	250	1079	250	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDICATOR					
BELLOWS	102	2.955	3	36	21
		3.531			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	7.32	4	4	4	4
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	7.32	0	0	0	0
OUT OF LIMITS	1	1	.00	.00	.00	.00	5.28	16	16	16	16
TOTAL	3	2	.00	.00	.00	.00	14.64	7	16	7	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
INDICATOR BOURDON TUBE									540	16.364	12	65	21			
										19.846						
OUT OF LIMITS	1	1	.00	.00	.00	.00	.56	122						122	122	122
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	3.15	2						2	2	2
FALSE RESPONSE	10	2	.00	.00	.00	.00	2.69	167						678	167	6
TOTAL	12	3	.00	.00	.00	.00	3.15	149						678	149	2
INDICATOR MANOMETER									2	.095	0	1	1			
										.099						
INDICATOR HELIX									5	.202	0	2	1			
										.202						
INDICATOR CONDUCTANCE									3	.029	0	1	1			
										.095						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INDICATOR PADDLE/TARGET						1	.043 .057	0	1	1
INDICATOR ORIFICE						18	.725 .912	0	4	4
INDICATOR RESISTANCE CHANGE						59	3.070 3.312	0	3	2
INDICATOR FLOAT						19	.649 .809	0	9	8
INDICATOR DIELECTRIC/CAPACITIVE						1	.010 .032	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INDICATOR													
NUCLEAR GAGE								1	.010	0	1		1
									.032				
INDICATOR													
STRAIN GAGE/RESISTANCE								10	.404	0	1		1
									.404				
INDICATOR													
SCINTILLATION								20	.834	0	2		2
									1.088				
INDICATOR													
FISSION CHAMBER								2	.060	0	2		2
									.084				
INDICATOR													
SELF-ENG./S.S.NEUTRON DETECTOR								4	.039	0	1		1
									.126				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
											OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INDICATOR													
FILLED LIQUID OR GAS							19	.339		0	5	4
								.744					
INDICATOR													
BIMETALLIC							22	.744		0	7	4
								1.121					
INDICATOR													
THERMOCOUPLE							18	.875		0	3	3
								.914					
INDICATOR													
THERMISTOR							1	.025		0	1	1
								.029					
INDICATOR													
RADIATION PYROMETER							2	.074		0	2	2
								.074					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDICATOR POTENTIOMETIC	2	.019	0	1	1
		.063			
INDICATOR OTHER	7	.182	0	3	2
		.235			
INDICATOR IRON VANE	89	3.512	6	20	8
		3.713			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	4	1	.00	.00	.00	.00	2.36	3	3	3	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.60	3626	3626	3626	3626
FALSE RESPONSE	1	1	.00	.00	.00	.00	.59	14	14	14	14
TOTAL	6	2	.00	.00	.00	.00	2.94	609	3626	609	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS		NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INDICATOR D'ARSONVAL GALVANOMETER(MILLIV.)			2658		96.975 / 116.402	83	215				40
PHYSICAL DISTORTION	2	1	.00	.00	.00	.00	.33	4	4	4	4
COLLAPSE	1	1	.00	.00	.00	.00	.22	8	8	8	8
WON'T CLOSE	1	1	.00	.00	.00	.00	.22	8	8	8	8
WON'T HOLD	1	1	.00	.00	.00	.00	.22	217	217	217	217
OUT OF LIMITS	30	11	.00	.00	.00	.00	22.76	109	947	109	0
OUT OF ADJUSTMENT	15	9	.00	.00	.00	.00	14.03	1044	6282	1044	9
SPURIOUS OPERATION	11	6	.00	.00	.00	.00	14.03	182	1600	182	1
FALSE RESPONSE	20	9	.00	.00	.00	.00	7.80	116	864	116	2
WON'T RESPOND	2	1	.00	.00	.00	.00	1.85	150	150	150	150
TOTAL	83	19	.00	.00	.00	.00	28.07	287	6282	287	0
INDICATOR MECHANICAL			893		30.176 / 35.643	42	95				23
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.10	3	3	3	3
FRACTURE/BREAK	2	1	.00	.00	.00	.00	1.61	97	192	97	2
WON'T START/MOVE	1	1	.00	.00	.00	.00	.80	4	4	4	4
OUT OF LIMITS	5	3	.00	.00	.00	.00	2.41	332	1345	332	8
OUT OF ADJUSTMENT	4	3	.00	.00	.00	.00	1.61	14	32	14	4
SPURIOUS OPERATION	17	3	.00	.00	.00	.00	9.65	307	2088	307	0
FALSE RESPONSE	12	3	.00	.00	.00	.00	4.02	463	2957	463	8
TOTAL	42	5	.00	.00	.00	.00	20.11	302	2957	302	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDICATOR OTHER	373	12.403	4	36	15
		17.749			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	24.01	24	24	24	24
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.19	216	216	216	216
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.47	5	5	5	5
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	32.60	0	0	0	0
TOTAL	4	4	.00	.00	.00	.19	32.60	61	216	61	0

INDICATOR SUMMER	1							.055	5	1	1
								.057			
OUT OF LIMITS	2	1	35.10	35.10	35.10	35.10	35.10	39	75	39	3
SPURIOUS OPERATION	2	1	35.10	35.10	35.10	35.10	35.10	774	1518	774	30
FALSE RESPONSE	1	1	17.55	17.55	17.55	17.55	17.55	794	794	794	794
TOTAL	5	1	87.75	87.75	87.75	87.75	87.75	484	1518	484	3

INDICATOR OTHER	10							.304	0	4	1
								.529			
OUT OF LIMITS	24	1	.00	.00	.00	.00	105.35	42	1009	42	0
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	13.42	244	244	244	244
TOTAL	25	2	.00	.00	.00	13.42	105.35	50	1009	50	0

INDICATOR MICRO	33							1.153	25	7	6
								1.179			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INDICATOR MERCURY								8	.421	.456	0	1	1		
INDICATOR REED								14	.423	.596	1	2	2		
FALSE RESPONSE	1	1	.00	.00	2.50	5.00	5.00			6	6	6	6		
TOTAL	1	1	.00	.00	2.50	5.00	5.00			6	6	6	6		
INDICATOR SOLID STATE								148	4.249	4.293	0	5	3		
INDICATOR OTHER								9	.365	.453	1	3	2		
WON'T START/MOVE	1	1	.00	.00	1.25	2.50	2.50			28	28	28	28		
TOTAL	1	1	.00	.00	1.25	2.50	2.50			28	28	28	28		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDICATOR PNEUMATIC-ON-OFF	2	.061	0	1	1
		.061			
INDICATOR ELECTRONIC-PROPORTIONAL	4	.133	0	4	4
		.168			
INDICATOR ELECTRONIC-ON-OFF	20	.847	5	9	5
		.918			
INDICATOR ELECTRONIC-OTHER	13	.370	0	2	2
		.372			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	3.51	6	6	6	6
FALSE RESPONSE	3	1	.00	.00	.00	.00	10.54	5	6	5	2
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	3.51	3	3	3	3
TOTAL	5	1	.00	.00	.00	.00	17.56	5	6	5	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY / AVERAGE RESTORATION HOURS	OP/CALENDAR HOURS(MILLIONS) / TOTAL FAILURES	NUMBER OF SYSTEMS / OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	NUMBER OF UNITS / LOWEST
INDICATOR OTHER								14	.426	0	4	1
									.426			
INDICATOR SERO-DRIVEN FEEDBACK								1	.020	0	1	1
									.033			
INDICATOR GALVONOMETER TYPE								32	1.150	0	6	3
									1.468			
INDICATOR PNEUMATIC								1	.035	1	1	1
									.038			
OUT OF ADJUSTMENT	1	1	26.31	26.31	26.31	26.31	26.31		1128	1128	1128	1128
TOTAL	1	1	26.31	26.31	26.31	26.31	26.31		1128	1128	1128	1128
INDICATOR OTHER								9	.054	0	3	2
									.087			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDICATOR UNDEFINED			790	22.422 32.723	13	95	22

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	17.56	2	2	2	2
WON'T START/MOVE	1	1	.00	.00	.00	.00	.17	845	845	845	845
OUT OF LIMITS	6	3	.00	.00	.00	.00	26.33	44	120	44	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.18	45	45	45	45
FALSE RESPONSE	3	3	.00	.00	.00	.00	8.78	74	192	74	3
DRIFT	1	1	.00	.00	.00	.00	.34	5	5	5	5
TOTAL	13	8	.00	.00	.00	.19	35.11	106	845	106	1

POWER SUPPLY DIAPHRAM											
			24	.806 .826	0	2	2				

POWER SUPPLY BELLOWS											
			25	.668 .881	0	3	3				

POWER SUPPLY CONDUCTANCE											
			12	.596 .596	0	3	2				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
POWER SUPPLY																
RESISTANCE CHANGE								16		.982	0	2	2			
										1.052						
POWER SUPPLY																
ION CHAMBER,UNCOMPENSATED								16		.596	0	2	2			
										.596						
POWER SUPPLY																
POTENTIOMETIC								2		.081	0	1	1			
										.081						
POWER SUPPLY																
AMPLIFIER								102		4.329	2	16	6			
										5.244						
OUT OF LIMITS	1	1	.00	.00	.00	.00	17.72			72		72	72	72		
FALSE RESPONSE	1	1	.00	.00	.00	.00	.24			1		1	1	1		
TOTAL	2	2	.00	.00	.00	.24	17.72			37		72	37	1		
POWER SUPPLY																
E-P CONVERTER								7		.067	0	1	1			
										.221						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE / MEDIAN / 75 TH PERCENTILE / ** MAXIMUM	AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST / AVERAGE / LOWEST	
POWER SUPPLY MV-I CONVERTER			21	.921	0	4	4
				1.181			
POWER SUPPLY I-I CONVERTER			8	.262	1	1	1
				.352			
OTHER (SEE REMARKS)	1	1	2.84 / 2.84 / 2.84 / 2.84 / 2.84	17	17	17 / 17	17
TOTAL	1	1	2.84 / 2.84 / 2.84 / 2.84 / 2.84	17	17	17 / 17	17
POWER SUPPLY AVERAGER			26	.741	0	1	1
				.741			
POWER SUPPLY DIFFERENTIATOR			6	.218	0	1	1
				.317			
POWER SUPPLY FUNCTION GENERATOR			27	.949	0	5	3
				1.025			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS									
			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS					
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
POWER SUPPLY MULTI-FUNCTION GENERATOR						12		.333	0	4	3
								.471			
POWER SUPPLY SQUARE-ROOT CONVERTER						7		.261	0	2	2
								.265			
POWER SUPPLY E-E CONVERTER						1443		55.851	27	124	37
								60.578			
WON'T START/MOVE	6	3	.00	.00	.00	.00	9.17	12	30	12	1
OUT OF LIMITS	4	2	.00	.00	.00	.00	6.16	3097	6795	3097	36
OUT OF ADJUSTMENT	3	3	.00	.00	.00	.00	4.58	122	361	122	1
SPURIOUS OPERATION	9	4	.00	.00	.00	.00	4.58	101	392	101	3
FALSE RESPONSE	3	2	.00	.00	.00	.00	5.06	4	8	4	1
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	9.17	45	88	45	2
TOTAL	27	9	.00	.00	.00	.00	27.50	512	6795	512	1
POWER SUPPLY I-E CONVERTER						263		9.909	2	6	6
								10.018			
WON'T HOLD	1	1	.00	.00	.00	.00	3.58	528	528	528	528
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	4.39	30	30	30	30
TOTAL	2	2	.00	.00	.00	3.58	4.39	279	528	279	30

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS HIGHEST	AVERAGE	NUMBER OF UNITS LOWEST
POWER SUPPLY OTHER								268	11.907	4	22		9
									12.984				
WON'T HOLD	1	1	.00	.00	.00	.65	9				9	9	9
SPURIOUS OPERATION	1	1	.00	.00	.00	.65	3				3	3	3
OPEN	1	1	.00	.00	.00	26.76	29				29	29	29
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.23	3				3	3	3
TOTAL	4	3	.00	.00	.00	26.76	11				29	11	3
POWER SUPPLY ELECTRONIC-PROPORTIONAL								6	.200	0	1		1
									.200				
POWER SUPPLY ELECTRONIC-ON-OFF								142	7.921	5	8		2
									9.184				
SPURIOUS OPERATION	4	2	.22	.22	.43	.65	325				1276	325	0
FALSE RESPONSE	1	1	.00	.00	.11	.22	7661				7661	7661	7661
TOTAL	5	2	.22	.22	.54	.87	1792				7661	1792	0
POWER SUPPLY ELECTRONIC-OTHER								10	.622	1	2		2
									.657				
FALSE RESPONSE	1	1	.00	.00	1.90	3.80	102				102	102	102
TOTAL	1	1	.00	.00	1.90	3.80	102				102	102	102

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
POWER SUPPLY													
OTHER								.057	1		0	1	1
								.057					
POWER SUPPLY													
OTHER								.104	2		0	2	2
								.104					
POWER SUPPLY													
UNDEFINED								11.686	221		16	16	10
								12.126					
OUT OF LIMITS	5	1	.00	.00	.00	.00	.91	432			491	432	198
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.50	6			6	6	6
ERRATIC OUTPUT	10	1	.00	.00	.00	.00	1.93	1513			1513	1513	1513
TOTAL	16	2	.00	.00	.00	.00	2.74	1081			1513	1081	6
INTEGRATOR (TOTALIZER)													
OTHER								.114	2		0	1	1
								.114					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INTEGRATOR (TOTALIZER) SUMMER								2	.051	.051	2	1	1			
OUT OF LIMITS	2	1	38.92	38.92	38.92	38.92	38.92				4	4	4	4	4	4
TOTAL	2	1	38.92	38.92	38.92	38.92	38.92				4	4	4	4	4	4
INTEGRATOR (TOTALIZER) INTEGRATOR								29	1.112	1.530	0	11	8			
INTEGRATOR (TOTALIZER) ELECTRONIC-ON-OFF								2	.061	.061	0	1	1			
INTEGRATOR (TOTALIZER) OTHER								4	.188	.188	0	2	2			
INTEGRATOR (TOTALIZER) UNDEFINED								107	3.488	3.830	0	4	2			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS		NUMBER OF UNITS
			FAILURES PER MILLION CALENDAR HOURS										
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	**	AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
RECORDER DIAPHRAM						3			.040 / .151	1		2	2
WON'T CLOSE	1	1	.00	.00	12.00	24.01	24.01		1		1	1	1
TOTAL	1	1	.00	.00	12.00	24.01	24.01		1		1	1	1
RECORDER BELLOWS						2			.061 / .061	0		1	1
RECORDER BOURDON TUBE						15			.569 / .598	0		4	2
RECORDER RESISTANCE CHANGE						4			.195 / .204	1		2	2
OUT OF ADJUSTMENT	1	1	.00	.00	15.21	30.43	30.43		98		98	98	98
TOTAL	1	1	.00	.00	15.21	30.43	30.43		98		98	98	98

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
RECORDER THERMOCOUPLE								.279 / .386	9		2	7	3			
FRACTURE/BREAK	1	1	.00	.00	.00	4.85	4.85	649						649	649	649
OUT OF ADJUSTMENT	1	1	.00	.00	.00	4.85	4.85	26						26	26	26
TOTAL	2	1	.00	.00	.00	9.71	9.71	338						649	338	26
RECORDER RADIATION PYROMETER								.055 / .057	1		0	1	1			
RECORDER POTENTIOMETIC								.213 / .225	4		0	3	3			
RECORDER D'ARSONVAL GALVANOMETER(MILLIV.)								.291 / .294	6		1	3	2			
OUT OF ADJUSTMENT	1	1	.00	.00	7.60	15.21	15.21	20						20	20	20
TOTAL	1	1	.00	.00	7.60	15.21	15.21	20						20	20	20

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			1	.051	1	1	1
				.055			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FALSE RESPONSE	1	1	18.03	18.03	18.03	18.03	18.03	48	48	48	48
TOTAL	1	1	18.03	18.03	18.03	18.03	18.03	48	48	48	48

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			1	.026	1	1	1
				.042			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FALSE RESPONSE	1	1	24.01	24.01	24.01	24.01	24.01	7	7	7	7
TOTAL	1	1	24.01	24.01	24.01	24.01	24.01	7	7	7	7

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			3	.053	0	2	2
				.129			

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			1	.042	0	1	1
				.042			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS								
								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM					
RECORDER ELECTRONIC-PROPORTIONAL								1			1	1
									.058 / .057			
FALSE RESPONSE	1	1	17.56	17.56	17.56	17.56	17.56		20		20	20
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56		20		20	20
RECORDER SERO-DRIVEN FEEDBACK								182			63	
									5.336 / 7.170			
LEAK	1	1	.00	.00	.00	.00	3.51		5		5	5
PHYSICAL DISTORTION	2	1	.00	.00	.00	.00	13.04		28		54	28
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	3.24		22		22	22
FRACTURE/BREAK	4	2	.00	.00	.00	.00	9.71		738		1416	738
WON'T START/MOVE	2	2	.00	.00	.00	.00	3.24		98		146	98
WON'T RELEASE	1	1	.00	.00	.00	.00	3.24		4		4	4
OUT OF LIMITS	7	4	.00	.00	.00	.00	10.67		24		45	24
OUT OF ADJUSTMENT	3	3	.00	.00	.00	.00	8.95		1571		4135	1571
SPURIOUS OPERATION	4	1	.00	.00	.00	.00	7.02		280		1006	280
FALSE RESPONSE	4	3	.00	.00	.00	.00	6.48		26		51	26
TOTAL	29	9	.00	.00	.00	.00	29.14		322		4135	322

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
RECORDER GALVONOMETER TYPE	162	5.998 7.375	20	52	18

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	4.47	187	187	187	187
PHYSICAL DISPLACEMENT	2	2	.00	.00	.00	.00	.90	74	147	74	1
FRACTURE/BREAK	3	2	.00	.00	.00	.00	4.76	45	85	45	16
HUN'T START/MOVE	2	2	.00	.00	.00	.00	4.47	134	229	134	39
OUT OF LIMITS	1	1	.00	.00	.00	.00	.71	24	24	24	24
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	.90	55	81	55	28
SPURIOUS OPERATION	9	5	.00	.00	.00	.71	9.52	714	4956	714	3
TOTAL	20	6	.00	.00	.00	2.38	14.28	365	4956	365	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
RECORDER PNEUMATIC	1	.035 .053	0	1	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
RECORDER OTHER	9	.427 .493	0	5	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
RECORDER UNDEFINED	49	1.683 2.053	9	23	12

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.55	6	6	6	6
OUT OF LIMITS	2	2	.00	.00	.00	.00	15.84	1	1	1	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.55	942	942	942	942
SPURIOUS OPERATION	3	2	.00	.00	.00	.00	15.84	3	5	3	2
FALSE RESPONSE	2	1	.00	.00	.00	.00	5.43	3	5	3	0
TOTAL	9	3	.00	.00	.00	.00	31.69	107	942	107	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SWITCH DIAPHRAM	438	12.049 16.454	27	61	18

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	.00	.50	1231	2453	1231	8
FRACTURE/BREAK	1	1	.00	.00	.00	.00	2.70	17	17	17	17
WON'T START/MOVE	2	2	.00	.00	.00	.00	.50	6	8	6	3
WON'T OPEN	1	1	.00	.00	.00	.00	1.10	24	24	24	24
WON'T RELEASE	2	2	.00	.00	.00	.00	.50	994	1900	994	88
OUT OF LIMITS	12	4	.00	.00	.00	.00	4.89	18	88	18	0
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	2.67	2	2	2	2
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	.50	15	25	15	5
DRIFT	3	1	.00	.00	.00	.00	1.50	8	8	8	8
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.45	1	1	1	1
TOTAL	27	8	.00	.00	.00	2.70	4.89	177	2453	177	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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SWITCH BELLOWS			363	11.360 / 15.106	33	76	24
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.78	4	4	4	4
WON'T OPEN	2	1	.00	.00	.00	1.76	3	3	3	3
WON'T HOLD	1	1	.00	.00	.00	.78	4	4	4	4
OUT OF LIMITS	13	5	.00	.00	.00	5.42	725	7945	725	0
OUT OF ADJUSTMENT	10	4	.00	.00	.00	3.51	235	1630	235	0
SPURIOUS OPERATION	1	1	.00	.00	.00	.98	3	3	3	3
FALSE RESPONSE	2	2	.00	.00	.00	17.56	388	746	388	29
DRIFT	2	1	.00	.00	.00	1.56	6	6	6	6
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.57	12	12	12	12
TOTAL	33	8	.00	.00	.00	17.56	382	7945	382	0
SWITCH BOURDON TUBE			451	16.280 / 21.129	60	57	19
WON'T START/MOVE	5	2	.00	.00	.00	1.34	3	6	3	1
WON'T OPEN	1	1	.00	.00	.00	.45	1	1	1	1
WON'T RELEASE	1	1	.00	.00	.00	.65	22	22	22	22
OUT OF LIMITS	47	5	.00	.00	.00	25.67	2	44	2	0
OUT OF ADJUSTMENT	5	1	.00	.00	.00	3.14	6	7	6	3
SPURIOUS OPERATION	1	1	.00	.00	.00	.12	7	7	7	7
TOTAL	60	7	.00	.00	.00	25.70	3	44	3	0
SWITCH MANOMETER			6	.171 / .171	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SWITCH ULTRASONIC								.298	6		1	1	1
								.329					
WON'T CLOSE	1	1	3.04	3.04	3.04	3.04	3.04	50					
TOTAL	1	1	3.04	3.04	3.04	3.04	3.04	50				50	50
												50	50
												50	50
SWITCH HELIX								.040	1		0	1	1
								.040					
SWITCH CONDUCTANCE								.027	4		0	1	1
								.027					
SWITCH PADDLE/TARGET								.302	9		0	3	2
								.415					
SWITCH ORIFILE								.046	1		0	1	1
								.055					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SWITCH POSITIVE DISPLACEMENT			6	.394 .394	0	1	1
SWITCH RESISTANCE CHANGE			20	.182 1.096	0	2	1
SWITCH FLOAT			257	10.338 12.598	9	29	13

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	2.03	24	24	24	24
CRACK	1	1	.00	.00	.00	.00	4.39	637	637	637	637
WON'T START/MOVE	1	1	.00	.00	.00	.00	3.00	6	6	6	6
WON'T CLOSE	1	1	.00	.00	.00	.00	2.03	459	459	459	459
WON'T RELEASE	1	1	.00	.00	.00	.00	3.00	574	574	574	574
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.72	21	21	21	21
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	3.00	354	628	354	79
FALSE RESPONSE	1	1	.00	.00	.00	.00	3.00	315	315	315	315
TOTAL	9	4	.00	.00	.00	1.72	12.01	305	637	305	6

SWITCH ION CHAMBER,COMPENSATED						3		.116 .161	1	2	2
OUT OF LIMITS	1	1	.00	.00	4.71	9.43	9.43	72	72	72	72
TOTAL	1	1	.00	.00	4.71	9.43	9.43	72	72	72	72

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									OP/CALENDAR HOURS(MILLIONS)	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SWITCH FISSION CHAMBER												
							1	.037	1	1	1
								.057			
OTHER (SEE REMARKS)	1	1	17.56	17.56	17.56	17.56	17.56	526	526	526	526
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56	526	526	526	526
SWITCH THERMOPILE												
							4	.039	0	1	1
								.126			
SWITCH FILLED LIQUID OR GAS												
							34	.372	2	5	5
								1.338			
WON'T CLOSE	1	1	.00	.00	.00	.00	8.78	7	7	7	7
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	8.78	6	6	6	6
TOTAL	2	1	.00	.00	.00	.00	17.55	7	7	7	6
SWITCH BIMETALLIC												
							64	1.813	6	6	5
								2.701			
OUT OF LIMITS	4	1	.00	.00	.00	.00	8.45	5	6	5	4
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.87	315	315	315	315
FALSE RESPONSE	1	1	.00	.00	.00	.00	2.22	24	24	24	24
TOTAL	6	3	.00	.00	.87	2.22	8.45	60	315	60	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)			OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SWITCH THERMOCOUPLE						30		.669	1	6		5
								1.652				
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.11	34		34	34	34
TOTAL	1	1	.00	.00	.00	.00	1.11	34		34	34	34
SWITCH THERMISTOR						20		1.175	7	2		2
								1.174				
OUT OF ADJUSTMENT	4	1	.00	.00	2.19	4.39	4.39	1		1	1	1
DRIFT	3	1	.00	.00	1.64	3.29	3.29	88		248	88	8
TOTAL	7	1	.00	.00	3.84	7.68	7.68	38		248	38	1
SWITCH POTENTIOMETIC						3		.121	0	2		1
								.121				
SWITCH OTHER						17		.842	0	2		2
								.876				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			FAILURES PER MILLION CALENDAR HOURS									
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SWITCH D'ARSONVAL GALVANOMETER(MILLIV.)						7		.249 / .256	0	4	4
SWITCH MECHANICAL						60		2.416 / 2.729	7	10	8
CRACK	2	1	.00	.00	.00	.00	5.85	31	31	31	31
OUT OF LIMITS	3	1	.00	.00	.00	.00	8.78	729	1072	729	42
FALSE RESPONSE	2	1	.00	.00	.00	.00	5.85	13	22	13	4
TOTAL	7	1	.00	.00	.00	.00	20.48	325	1072	325	4
SWITCH AMPLIFIER						8		.342 / .416	0	3	3
SWITCH MV-I CONVERTER						2		.102 / .111	2	1	1
WON'T CLOSE	2	1	18.02	18.02	18.02	18.02	18.02	192	192	192	192
TOTAL	2	1	18.02	18.02	18.02	18.02	18.02	192	192	192	192

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS OUT-OF-SERVICE HIGHEST	AVERAGE	NUMBER OF UNITS HOURS LOWEST
SWITCH I-I CONVERTER								2	.081	.081	0	1		1
SWITCH E-E CONVERTER								6	.318	.318	0	1		1
SWITCH OTHER								10	.243	.522	0	3		3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SWITCH MICRO	2325	83.483 96.634	70	177	33

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	1	.00	.00	.00	.00	1.05	74	74	74	74
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	2.93	9	9	9	9
WON'T START/MOVE	5	1	.00	.00	.00	.00	14.63	116	245	116	3
WON'T OPEN	1	1	.00	.00	.00	.00	.38	75	75	75	75
WON'T HOLD	1	1	.00	.00	.00	.00	.28	26	26	26	26
WON'T RELEASE	2	2	.00	.00	.00	.00	.38	4	5	4	3
OUT OF LIMITS	32	9	.00	.00	.00	.25	17.56	12	116	12	0
OUT OF ADJUSTMENT	16	4	.00	.00	.00	.00	3.94	182	1104	361	1
SPURIOUS OPERATION	3	2	.00	.00	.00	.00	.77	29	72	29	7
FALSE RESPONSE	4	4	.00	.00	.00	.00	2.93	430	1503	430	1
HIGH FLOW	1	1	.00	.00	.00	.00	.29	1	1	1	1
DRIFT	1	1	.00	.00	.00	.00	.25	0	0	0	0
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.26	72	72	72	72
TOTAL	70	17	.00	.00	.16	1.82	20.48	127	1503	127	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SWITCH MERCURY	220	8.781 10.050	28	47	22

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.54	648	648	648	648
WON'T START/MOVE	2	2	.00	.00	.00	.00	.73	4	5	4	2
WON'T CLOSE	2	2	.00	.00	.00	.00	2.40	3	4	3	2
WON'T RELEASE	1	1	.00	.00	.00	.00	1.57	0	0	0	0
OUT OF LIMITS	15	4	.00	.00	.00	.00	12.53	83	1201	83	0
OUT OF ADJUSTMENT	3	2	.00	.00	.00	.00	1.07	3	6	3	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	2.40	6	6	6	6
FALSE RESPONSE	3	3	.00	.00	.00	.00	2.40	242	720	242	2
TOTAL	28	4	.00	.00	.00	.73	15.67	94	1201	94	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SWITCH REED			474	16.116 17.978	6	40	11

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	.00	.00	.24	172	172	172	172
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	14.88	44	57	44	31
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.24	1772	1772	1772	1772
FALSE RESPONSE	2	2	.00	.00	.00	.00	1.08	79	145	79	13
TOTAL	6	4	.00	.00	.00	.71	14.88	365	1772	365	13

SWITCH SOLID STATE			1461	53.779 62.403	37	87	29				
OUT OF LIMITS	34	7	.00	.00	.00	.00	49.31	33	4875	155	1
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.54	5	5	5	5
FALSE RESPONSE	2	2	.00	.00	.00	.00	1.03	53	93	53	12
TOTAL	37	10	.00	.00	.00	.95	49.31	34	4875	146	1

SWITCH OTHER			920	24.587 36.236	7	39	22				
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.98	12	12	12	12
OUT OF LIMITS	1	1	.00	.00	.00	.00	5.28	26	26	26	26
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.46	8	8	8	8
SPURIOUS OPERATION	3	2	.00	.00	.00	.00	1.95	420	1128	420	11
DRIFT	1	1	.00	.00	.00	.00	15.22	1	1	1	1
TOTAL	7	5	.00	.00	.00	.00	15.22	187	1128	187	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
SWITCH ELECTRONIC-ON-OFF									266	8.630	5	16	7			
										10.768						
WON'T START/MOVE	3	1	.00	.00	.00	.00	1.25	1						1	1	1
WON'T OPEN	2	1	.00	.00	.00	.00	.84	1						1	1	1
TOTAL	5	1	.00	.00	.00	.00	2.09	1						1	1	1
SWITCH ELECTRONIC-OTHER									7	.067	2	4	3			
										.196						
WON'T HOLD	2	1	.00	.00	.00	18.25	18.25	14						24	14	4
TOTAL	2	1	.00	.00	.00	18.25	18.25	14						24	14	4
SWITCH OTHER									117	4.573	0	3	3			
										4.925						
SWITCH UNDEFINED									1351	43.699	22	77	23			
										52.731						
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.38	2						2	2	2
OUT OF LIMITS	18	5	.00	.00	.00	.00	4.39	26						316	26	0
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.32	316						316	316	316
FALSE RESPONSE	2	2	.00	.00	.00	.00	3.51	19						24	19	13
TOTAL	22	7	.00	.00	.00	.32	4.39	37						316	37	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER DIAPHRAM			1206	44.822 54.819	92	204	46

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	10	7	.00	.00	.00	.00	10.87	214	800	214	1
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	2.22	9	9	9	9
COLLAPSE	1	1	.00	.00	.00	.00	1.41	4	4	4	4
OUT OF LIMITS	38	10	.00	.00	.00	.00	7.80	126	1307	126	1
OUT OF ADJUSTMENT	9	6	.00	.00	.00	.00	9.52	127	446	127	8
SPURIOUS OPERATION	6	4	.00	.00	.00	.00	1.11	508	2824	851	9
FALSE RESPONSE	26	9	.00	.00	.00	.00	18.91	99	720	99	2
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.46	2	2	2	2
TOTAL	92	20	.00	.00	.00	2.22	23.12	156	2824	171	1

TRANSMITTER BELLOWS			806	28.678 34.998	135	142	41

LEAK	5	5	.00	.00	.00	.00	1.27	433	1992	433	2
PHYSICAL DISTORTION	2	2	.00	.00	.00	.00	4.90	42	74	42	9
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	1.86	268	268	268	268
FRACTURE/BREAK	2	2	.00	.00	.00	.00	1.58	85	96	85	74
WON'T START/MOVE	1	1	.00	.00	.00	.00	.43	76	76	76	76
WON'T CLOSE	1	1	.00	.00	.00	.00	.61	3	3	3	3
WON'T OPEN	1	1	.00	.00	.00	.00	1.89	304	304	304	304
WON'T HOLD	1	1	.00	.00	.00	.00	.58	58	58	58	58
OUT OF LIMITS	31	11	.00	.00	.00	.37	14.70	227	2570	227	1
OUT OF ADJUSTMENT	33	11	.00	.00	.00	.37	18.25	116	2835	116	0
SPURIOUS OPERATION	16	7	.00	.00	.00	.00	2.99	599	3580	599	2
FALSE RESPONSE	35	11	.00	.00	.00	.61	9.80	578	6124	578	0
DRIFT	2	1	.00	.00	.00	.00	2.70	2	2	2	1
OTHER (SEE REMARKS)	4	4	.00	.00	.00	.00	1.05	27	70	27	2
TOTAL	135	20	.00	.00	.00	5.66	44.11	325	6124	325	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER BOURDON TUBE			429	15.512	12	119	38
				18.480			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.88	44	44	44	44
OUT OF LIMITS	5	4	.00	.00	.00	.00	9.17	1340	3297	1340	4
OUT OF ADJUSTMENT	3	2	.00	.00	.00	.00	2.72	1305	3709	1305	50
FALSE RESPONSE	3	3	.00	.00	.00	.00	1.50	93	237	93	15
TOTAL	12	8	.00	.00	.00	.00	9.17	912	3709	912	4

TRANSMITTER MANOMETER						18		.948	1	6	4
								.957			
FALSE RESPONSE	1	1	.00	.00	.00	.00	20.95	264	264	264	264
TOTAL	1	1	.00	.00	.00	.00	20.95	264	264	264	264

TRANSMITTER HELIX						17		.370	0	6	5
								.625			

TRANSMITTER CONDUCTANCE						14		.410	1	8	7
								.532			
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	12.01	4	4	4	4
TOTAL	1	1	.00	.00	.00	.00	12.01	4	4	4	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			13	.452	0	3	3
				.464			
TRANSMITTER PADDLE/TARGET							
			22	1.049	2	10	8
				1.104			
TRANSMITTER ORIFICE							
FALSE RESPONSE	2	1					
TOTAL	2	1					

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FALSE RESPONSE	2	1	.00	.00	.00	.00	4.45	361	361	361	361
TOTAL	2	1	.00	.00	.00	.00	4.45	361	361	361	361

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER NOZZLE	4	.228	0	1	1
		.228			
TRANSMITTER VENTURI TUBE	13	.398	0	2	2
		.427			
TRANSMITTER POSITIVE DISPLACEMENT	41	1.585	0	12	6
		1.604			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TRANSMITTER PITOT TUBE											
COMPONENTS IN CATEGORY: 4								.219	0	1	1
UP/CALENDAR HOURS (MILLIONS): .228											
TOTAL FAILURES: 0											
NUMBER OF SYSTEMS: 1											
NUMBER OF UNITS: 1											
TRANSMITTER RESISTANCE CHANGE											
COMPONENTS IN CATEGORY: 171								5.999	4	26	18
UP/CALENDAR HOURS (MILLIONS): 6.595											
TOTAL FAILURES: 4											
NUMBER OF SYSTEMS: 26											
NUMBER OF UNITS: 18											
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.01	3	3	3	3
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.01	12	12	12	12
FALSE RESPONSE	2	2	.00	.00	.00	.00	34.23	445	876	445	13
TOTAL	4	3	.00	.00	.00	.00	34.23	226	876	226	3
TRANSMITTER FLOAT											
COMPONENTS IN CATEGORY: 22								.972	1	12	10
UP/CALENDAR HOURS (MILLIONS): 1.003											
TOTAL FAILURES: 1											
NUMBER OF SYSTEMS: 12											
NUMBER OF UNITS: 10											
OUT OF LIMITS	1	1	.00	.00	.00	.00	4.70	136	136	136	136
TOTAL	1	1	.00	.00	.00	.00	4.70	136	136	136	136
TRANSMITTER DIELECTRIC/CAPACITIVE											
COMPONENTS IN CATEGORY: 1								.042	1	1	1
UP/CALENDAR HOURS (MILLIONS): .057											
TOTAL FAILURES: 1											
NUMBER OF SYSTEMS: 1											
NUMBER OF UNITS: 1											
OUT OF LIMITS	1	1	17.55	17.55	17.55	17.55	17.55	19	19	19	19
TOTAL	1	1	17.55	17.55	17.55	17.55	17.55	19	19	19	19

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER PIEZOELECTRIC	16	.550	4	1	1
		.612			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF ADJUSTMENT	4	1	6.54	6.54	6.54	6.54	6.54	389	389	389	389
TOTAL	4	1	6.54	6.54	6.54	6.54	6.54	389	389	389	389

TRANSMITTER STRAIN GAGE/RESISTANCE	128	5.141	11	15	8
		5.227			

OUT OF LIMITS	1	1	.00	.00	.00	.00	1.76	163	163	163	163
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	.47	6	6	6	6
SPURIOUS OPERATION	4	1	.00	.00	.00	.00	7.02	306	879	306	67
FALSE RESPONSE	4	1	.00	.00	.00	.00	7.02	91	320	91	1
TOTAL	11	2	.00	.00	.00	.00	15.80	160	879	160	1

TRANSMITTER SCINTILLATION	2	.110	4	2	2
		.110			

WON'T START/MOVE	3	2	18.93	18.93	27.02	35.12	35.12	199	238	199	169
SPURIOUS OPERATION	1	1	.00	.00	9.46	18.93	18.93	286	286	286	286
TOTAL	4	2	35.12	35.12	36.49	37.86	37.86	221	286	221	169

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TRANSMITTER GEIGER-MULLER								4		.220	7	2	2			
										.220						
LEAK	1	1	.00	.00	4.73	9.46	9.46			290				290	290	290
WON'T START/MOVE	2	1	.00	.00	8.77	17.55	17.55			47				91	47	3
SPURIOUS OPERATION	3	2	8.78	8.78	13.85	18.92	18.92			616				958	616	74
FALSE RESPONSE	1	1	.00	.00	4.39	8.78	8.78			1102				1102	1102	1102
TOTAL	7	2	28.38	28.38	31.74	35.10	35.10			476				1102	476	3
TRANSMITTER ION CHAMBER,UNCOMPENSATED								1		.051	0	1	1			
										.055						
TRANSMITTER FISSION CHAMBER								1		.027	0	1	1			
										.042						
TRANSMITTER FILLED LIQUID OR GAS								3		.119	3	3	2			
										.118						
FALSE RESPONSE	2	1	.00	.00	17.56	35.12	35.12				7			8	7	5
WON'T OPERATE PER DEM	1	1	.00	.00	8.78	17.56	17.56				3			3	3	3
TOTAL	3	1	.00	.00	26.33	52.67	52.67				5			8	5	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER BIMETALLIC	1	.033	0	1	1
		.033			
TRANSMITTER THERMOCOUPLE	37	1.513	0	7	7
		1.808			
TRANSMITTER THERMISTOR	12	.400	0	1	1
		.400			
TRANSMITTER POTENTIOMETIC	39	1.626	28	8	6
		1.788			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	1	.00	.00	.00	.00	4.35	398	722	399	73
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	2.17	71	71	71	71
PHYSICAL DISPLACEMENT	2	1	.00	.00	.00	.00	4.35	77	128	77	25
WON'T START/MOVE	4	2	.00	.00	.00	6.01	6.52	101	231	101	28
WON'T HOLD	2	1	.00	.00	.00	.00	4.35	31	48	31	13
WON'T RELEASE	1	1	.00	.00	.00	.00	2.17	204	204	204	204
OUT OF LIMITS	6	2	.00	.00	.00	6.52	18.02	24	74	24	6
OUT OF ADJUSTMENT	4	1	.00	.00	.00	.00	8.69	531	1760	531	20
SPURIOUS OPERATION	4	3	.00	.00	1.08	3.90	6.01	5	7	5	2
FALSE RESPONSE	2	2	.00	.00	.00	2.17	4.01	2003	3998	2003	7
TOTAL	29	4	.00	.00	1.95	30.83	43.47	285	3998	285	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER OTHER			53	1.731	2	16	7
				2.587			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	2.36	329	329	329	329
FALSE RESPONSE	1	1	.00	.00	.00	.00	.91	0	0	0	0
TOTAL	2	2	.00	.00	.00	.91	2.36	165	329	165	0

TRANSMITTER IRON VANE	1	.037	0	1	1		
		.037					

TRANSMITTER D'ARSONVAL GALVANOMETER(MILLIV.)	8	.203	1	3	3		
		.361					

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	.00	15.21	15.21	35	35	35	35
TOTAL	1	1	.00	.00	.00	15.21	15.21	35	35	35	35

TRANSMITTER MECHANICAL	13	.286	0	2	2		
		.421					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TRANSMITTER AMPLIFIER								18		.445	2	6	5			
										.456						
OUT OF LIMITS	1	1	.00	.00	.00	.00	22.76				13	13	13	13		
FALSE RESPONSE	1	1	.00	.00	.00	.00	17.55				2	2	2	2		
TOTAL	2	2	.00	.00	.00	17.55	22.76				8	13	8	2		
TRANSMITTER MV-I CONVERTER								15		.656	0	2	2			
										.760						
TRANSMITTER I-I CONVERTER								2		.101	0	1	1			
										.106						
TRANSMITTER SUMMER								3		.171	0	1	1			
										.171						
TRANSMITTER SQUARE-ROOT CONVERTER								1		.046	0	1	1			
										.055						

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TRANSMITTER																
E-E CONVERTER								22		1	3	1	1.065			
													1.163			
FALSE RESPONSE	1	1	.86	.86	.86	.86	.86						344	344	344	344
TOTAL	1	1	.86	.86	.86	.86	.86						344	344	344	344
TRANSMITTER																
OTHER								5		0	2	1	.254			
													.264			
TRANSMITTER																
REED								2		1	1	1	--			
													.067			
WON'T OPEN	1	1	15.01	15.01	15.01	15.01	15.01						960	960	960	960
TOTAL	1	1	15.01	15.01	15.01	15.01	15.01						960	960	960	960
TRANSMITTER																
SOLID STATE								6		0	3	3	.299			
													.303			

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TRANSMITTER ELECTRONIC-PROPORTIONAL	10	.285	0	2	1
		.285			
TRANSMITTER ELECTRONIC-ON-OFF	3	.148	2	2	2
		.166			
TRANSMITTER ELECTRONIC-OTHER	9	.257	0	2	1
		.257			
TRANSMITTER OTHER	1	.037	0	1	1
		.037			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FALSE RESPONSE	2	1	.00	.00	9.19	18.38	18.38	54	104	54	4
TOTAL	2	1	.00	.00	9.19	18.38	18.38	54	104	54	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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TRANSMITTER					
UNDEFINED	348	11.912	24	60	22
		13.702			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	15	5	.00	.00	.00	.00	21.82	453	5250	453	0
OUT OF ADJUSTMENT	6	3	.00	.00	.00	.00	2.33	114	643	114	2
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	1.17	64	104	64	24
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.00	21	21	21	21
TOTAL	24	6	.00	.00	.00	.98	21.82	318	5250	318	0

OTHER					
DIAPHRAM	24	.639	0	2	2
		.826			

OTHER					
ORIFILE	6	.039	0	2	2
		.229			

OTHER					
STRAIN GAGE/RESISTANCE	6	.202	0	2	2
		.207			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
											OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER AMPLIFIER							1	.047	.047	0	1	1
OTHER E-P CONVERTER							4	--	.123	0	1	1
OTHER MV-I CONVERTER							7	.188	.241	0	3	2
OTHER I-I CONVERTER							36	.324	.324	0	2	2
OTHER E-E CONVERTER							1	.031	.055	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER I-E CONVERTER	2	.094	0	1	1
		.094			
OTHER OTHER	38	.701	9	6	5
		1.620			
OUT OF LIMITS	2	1.48	205	205	205
OUT OF ADJUSTMENT	2	1.48	32	32	32
SPURIOUS OPERATION	1	2.24	244	244	244
FALSE RESPONSE	2	1.48	275	315	234
OTHER (SEE REMARKS)	2	1.48	217	217	217
TOTAL	9	20.14	189	315	32
OTHER SOLID STATE	20	1.033	0	3	3
		1.157			
OTHER ELECTRONIC-PROPORTIONAL	3	.067	0	2	2
		.089			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	2	1	.00	.00	.00	.00	4.48	205	205	205	205
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	4.48	32	32	32	32
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	2.24	244	244	244	244
FALSE RESPONSE	2	1	.00	.00	.00	.00	4.48	275	315	275	234
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	4.48	217	217	217	217
TOTAL	9	1	.00	.00	.00	.00	20.14	189	315	189	32

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER															
ELECTRONIC-UN-OFF								2							
							.061			0	1	1			
							.061								
OTHER															
OTHER								313							
							14.191			1	11	7			
							16.165								
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.10		154		154	154	154		154
TOTAL	1	1	.00	.00	.00	.00	1.10		154		154	154	154		154
OTHER															
UNDEFINED								45							
							.942			2	5	4			
							1.995								
OUT OF LIMITS	2	2	.00	.00	.00	.34	14.80		2		3	2	1		
TOTAL	2	2	.00	.00	.00	.34	14.80		2		3	2	1		
COMPUTATION MODULE															
DIAPHRAM								1							
							.010			0	1	1			
							.032								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
COMPUTATION MODULE BELLOWS			5	.186	0	2	2
				.237			
COMPUTATION MODULE RESISTANCE CHANGE			9	.317	1	3	3
				.318			
OUT OF ADJUSTMENT	1	1	.00	.00	.00	25.17	25.17	1	1	1	1
TOTAL	1	1	.00	.00	.00	25.17	25.17	1	1	1	1
COMPUTATION MODULE NUCLEAR GAGE			8	.328	0	2	2
				.447			
COMPUTATION MODULE SCINTILLATION			5	.182	3	1	1
				.182			
SPURIOUS OPERATION	1	1	5.50	5.50	5.50	5.50	5.50	30	30	30	30
FALSE RESPONSE	2	1	11.00	11.00	11.00	11.00	11.00	79	79	79	79
TOTAL	3	1	16.50	16.50	16.50	16.50	16.50	63	79	63	30

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
COMPUTATION MODULE SELF-ENG./S.S.NEUTRON DETECTOR	2	.094 .094	0	1	1
COMPUTATION MODULE FILLED LIQUID OR GAS	20	.836 1.017	0	3	3
COMPUTATION MODULE ION EXCHANGE	12	.348 .348	2	2	2
COMPUTATION MODULE AMPLIFIER	1515	56.773 67.252	40	87	42

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
WON'T RELEASE	1	1	.00	.00	1.93	3.87	3.87	135	135	135	135
SPURIOUS OPERATION	1	1	.00	.00	1.93	3.87	3.87	2922	2922	2922	2922
TOTAL	2	1	.00	.00	3.97	7.74	7.74	1529	2922	1529	135
WON'T START/MOVE	2	2	.00	.00	.00	.00	1.30	73	96	73	49
WON'T STOP	1	1	.00	.00	.00	.00	.17	621	621	621	621
WON'T HOLD	1	1	.00	.00	.00	.00	.33	26	26	26	26
OUT OF LIMITS	12	5	.00	.00	.00	.00	11.70	526	6022	526	1
OUT OF ADJUSTMENT	3	3	.00	.00	.00	.00	5.86	75	219	75	2
SPURIOUS OPERATION	10	7	.00	.00	.00	.00	7.80	300	2288	300	2
FALSE RESPONSE	11	6	.00	.00	.00	.00	5.85	876	4997	876	5
TOTAL	40	15	.00	.00	.00	.45	25.35	499	6022	499	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
COMPUTATION MODULE E-P CONVERTER	42	1.406 1.914	0	17	13
COMPUTATION MODULE I-P CONVERTER	33	1.124 1.322	0	11	6
COMPUTATION MODULE MV-I CONVERTER	309	13.661 16.289	10	36	22
COMPUTATION MODULE I-I CONVERTER	660	30.877 33.873	13	44	20

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.63	7	7	7	7
OUT OF LIMITS	1	1	.00	.00	.00	.00	6.93	1	1	1	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.63	5	5	5	5
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	2.96	1003	2003	1003	3
FALSE RESPONSE	5	4	.00	.00	.00	.00	7.51	375	1669	375	4
TOTAL	10	5	.00	.00	.00	.00	7.51	389	2003	389	1
OUT OF LIMITS	6	4	.00	.00	.00	.00	2.74	27	112	27	1
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	.24	6	8	6	4
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	1.67	495	768	495	221
FALSE RESPONSE	3	2	.00	.00	.00	.00	.41	98	167	98	4
TOTAL	13	6	.00	.00	.00	.00	2.74	112	768	112	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
COMPUTATION MODULE SUMMER			529	21.727 23.957	18	61	43
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	9	6	.00	.00	.00	.00	17.55	159	830	159	4
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	.78	21	25	21	16
SPURIOUS OPERATION	5	4	.00	.00	.00	.00	2.18	91	286	91	7
FALSE RESPONSE	2	2	.00	.00	.00	.00	30.43	26	26	26	26
TOTAL	18	9	.00	.00	.00	.00	30.43	110	830	110	4
COMPUTATION MODULE AVERAGER			119	4.779 5.553	48	18	18
WON'T START/MOVE	1	1	.00	.00	.00	.00	2.93	24	24	24	24
OUT OF LIMITS	9	6	.00	.00	.00	4.39	21.28	267	1440	267	7
OUT OF ADJUSTMENT	9	4	.00	.00	.00	.00	14.63	66	257	66	12
SPURIOUS OPERATION	14	3	.00	.00	.00	.00	17.56	1173	7967	1173	0
FALSE RESPONSE	15	6	.00	.00	.00	3.57	16.30	245	2904	245	0
TOTAL	48	9	.00	.00	2.48	21.28	43.90	482	7967	482	0
COMPUTATION MODULE DIFFERENTIATOR			201	7.784 8.427	10	18	12
OUT OF LIMITS	4	2	.00	.00	.00	.00	7.02	22	75	22	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.20	157	157	157	157
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	7.02	8	15	8	0
FALSE RESPONSE	3	2	.00	.00	.00	.00	7.02	49	144	49	2
TOTAL	10	2	.00	.00	.00	.00	21.06	41	157	41	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPUTATION MODULE INTEGRATOR			77	2.983 3.907	1	19	16

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ERRATIC OUTPUT	1	1	.00	.00	.00	4.39	334	334	334	334
TOTAL	1	1	.00	.00	.00	4.39	334	334	334	334

COMPUTATION MODULE FUNCTION GENERATOR										
					156		6.961 7.954	23	38	21
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	5.93	2	2	2	2
WON'T START/MOVE	1	1	.00	.00	.00	5.85	27	27	27	27
OUT OF LIMITS	5	4	.00	.00	.00	7.92	86	265	86	1
SPURIOUS OPERATION	6	3	.00	.00	.00	6.31	386	1593	386	2
FALSE RESPONSE	10	2	.00	.00	.00	6.31	21	54	21	1
TOTAL	23	6	.00	.00	4.39	18.93	130	1593	130	1

COMPUTATION MODULE MULTI-FUNCTION GENERATOR										
					14		.474 .483	15	7	5
FRACTURE/BREAK	1	1	.00	.00	.00	12.01	0	0	0	0
WON'T START/MOVE	1	1	.00	.00	.00	12.01	4	4	4	4
WON'T HOLD	1	1	.00	.00	.00	6.51	169	169	169	169
WON'T RELEASE	2	1	.00	.00	.00	24.03	29	53	29	5
OUT OF LIMITS	3	2	.00	.00	12.01	30.43	36	98	36	3
OUT OF ADJUSTMENT	1	1	.00	.00	.00	12.01	25	25	25	25
SPURIOUS OPERATION	3	2	.00	.00	15.21	24.03	198	546	198	18
FALSE RESPONSE	3	2	.00	.00	15.21	24.03	25	50	25	2
TOTAL	15	3	.00	4.51	60.86	120.12	69	546	69	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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									OP/CALENDAR HOURS(MILLIONS)	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
COMPUTATION MODULE SQUARE-ROOT CONVERTER						625		24.757 29.210	19	113		48
OUT OF LIMITS	10	5	.00	.00	.00	.00	17.55	38	144	38		3
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	4.07	80	80	80		80
SPURIOUS OPERATION	4	3	.00	.00	.00	.00	6.09	488	1650	488		2
FALSE RESPONSE	3	2	.00	.00	.00	.00	6.09	154	361	154		26
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	1.46	23	23	23		23
TOTAL	19	10	.00	.00	.00	.00	18.26	152	1650	152		2
COMPUTATION MODULE E-E CONVERTER						629		22.841 28.265	31	54		34
OUT OF LIMITS	18	4	.00	.00	.00	.00	10.56	37	376	37		1
SPURIOUS OPERATION	7	3	.00	.00	.00	.00	17.56	31	91	31		3
FALSE RESPONSE	5	5	.00	.00	.00	.00	3.52	294	1271	294		17
LOW OUTPUT	1	1	.00	.00	.00	.00	.11	1	1	1		1
TOTAL	31	9	.00	.00	.00	.42	17.56	76	1271	76		1
COMPUTATION MODULE I-E CONVERTER						1011		35.654 44.209	20	26		17
OUT OF LIMITS	3	2	.00	.00	.00	.00	10.17	51	76	51		4
OUT OF ADJUSTMENT	5	3	.00	.00	.00	.00	18.26	36	175	36		0
SPURIOUS OPERATION	5	1	.00	.00	.00	.00	.82	73	125	73		11
FALSE RESPONSE	6	1	.00	.00	.00	.00	.99	164	605	164		31
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	4.53	1	1	1		1
TOTAL	20	5	.00	.00	.00	1.81	24.34	84	605	84		0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPUTATION MODULE OTHER			1315	48.436	22	55	25
				53.430			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	.15	96	96	96	96
WON'T OPEN	1	1	.00	.00	.00	.00	.19	46	46	46	46
WON'T HOLD	2	2	.00	.00	.00	.00	.19	702	946	702	458
WON'T RELEASE	1	1	.00	.00	.00	.00	.15	75	75	75	75
OUT OF LIMITS	8	5	.00	.00	.00	.00	.78	38	216	47	0
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	15.01	3	4	3	2
FALSE RESPONSE	5	4	.00	.00	.00	.00	15.01	1038	5180	1038	1
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	.30	47	48	47	46
TOTAL	22	8	.00	.00	.00	.56	30.03	328	5180	331	0

COMPUTATION MODULE SOLID STATE											
						45		1.884	1	7	5
								1.884			
OUT OF LIMITS	1	1	.00	.00	.00	.00	.93	6	6	6	6
TOTAL	1	1	.00	.00	.00	.00	.93	6	6	6	6

COMPUTATION MODULE OTHER											
						1		.047	0	1	1
								.047			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
COMPUTATION MODULE ELECTRONIC-PROPORTIONAL	65	2.946	2	6	6
		2.953			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	.84	378	378	378	378
FALSE RESPONSE	1	1	.00	.00	.00	.00	.84	57	57	57	57
TOTAL	2	1	.00	.00	.00	.00	1.68	218	378	218	57

COMPUTATION MODULE ELECTRONIC-ON-OFF											
	220	6.711	2	9	5						
		6.728									
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	.33	28	40	28	16
TOTAL	2	1	.00	.00	.00	.00	.33	28	40	28	16

COMPUTATION MODULE ELECTRONIC-OTHER											
	57	3.072	4	8	4						
		3.566									
WON'T START/MOVE	1	1	.00	.00	.00	.00	.61	2	2	2	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.56	4	4	4	4
FALSE RESPONSE	2	1	.00	.00	.00	.00	1.13	13	24	13	1
TOTAL	4	2	.00	.00	.00	.30	1.69	8	24	8	1

COMPUTATION MODULE OTHER											
	4	.179	1	3	3						
		.179									
OUT OF LIMITS	1	1	.00	.00	.00	17.55	17.55	9	9	9	9
TOTAL	1	1	.00	.00	.00	17.55	17.55	9	9	9	9

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
COMPUTATION MODULE																
UNDEFINED								172		5.683	1	19	13			
										6.618						
FALSE RESPONSE	1	1	.00	.00	.00	.00	29.38			48		48	48	48		
TOTAL	1	1	.00	.00	.00	.00	29.38			48		48	48	48		
UNDEFINED																
DIAPHRAM								2		.090	0	1	1			
										.114						
UNDEFINED																
ORIFICE								2		.067	0	1	1			
										.067						
UNDEFINED																
OTHER								8		.335	0	2	2			
										.439						
UNDEFINED																
D'ARSONVAL GALVANOMETER(MILLIV.)								4		.118	0	3	2			
										.180						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE / MEDIAN / 75 TH PERCENTILE / MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST / AVERAGE / LOWEST		
UNDEFINED AMPLIFIER			12	-- / .789	0	1	1
UNDEFINED E-P CONVERTER			4	-- / .171	0	2	2
UNDEFINED E-E CONVERTER			3	.112 / .112	0	1	1
UNDEFINED I-E CONVERTER			18	.786 / 1.026	0	1	1
UNDEFINED OTHER			16	.660 / .907	0	3	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

INSTRUMENTATION AND CONTROLS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED REED	8	.246 .263	0	1	1
UNDEFINED PNEUMATIC-PROPORTIONAL	2	.061 .066	0	1	1
UNDEFINED ELECTRONIC-OTHER	4	-- .114	0	1	1
UNDEFINED UNDEFINED	610	8.199 19.228	9	35	13

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FRACTURE/BREAK	1	1	.00	.00	.00	.17	24	24	24	24
WON'T START/MOVE	1	1	.00	.00	.00	.70	40	40	40	40
OUT OF LIMITS	2	2	.00	.00	.00	5.85	70	137	70	2
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.35	29	50	29	8
SPURIOUS OPERATION	2	1	.00	.00	.00	.35	130	180	130	80
FALSE RESPONSE	1	1	.00	.00	.00	4.22	4	4	4	4
TOTAL	9	4	.00	.00	.00	.87	5.85	58	180	58

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

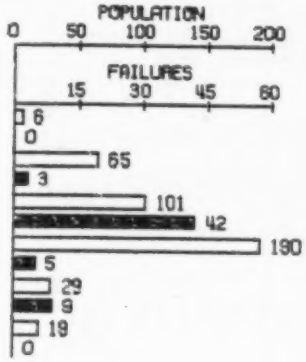
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

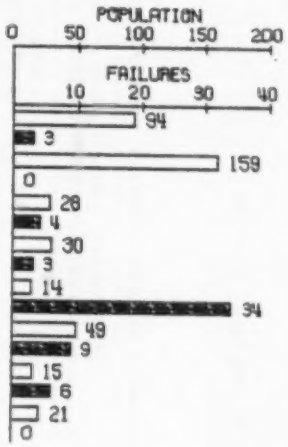
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
MECHANICAL FUNCTION UNITS	410	20.6021	59	2546	236	1

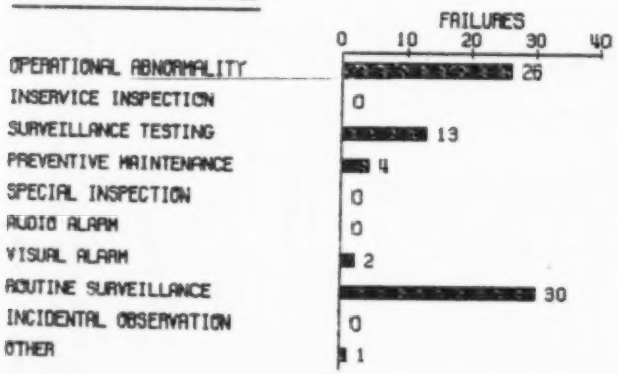
TYPE/CATEGORY



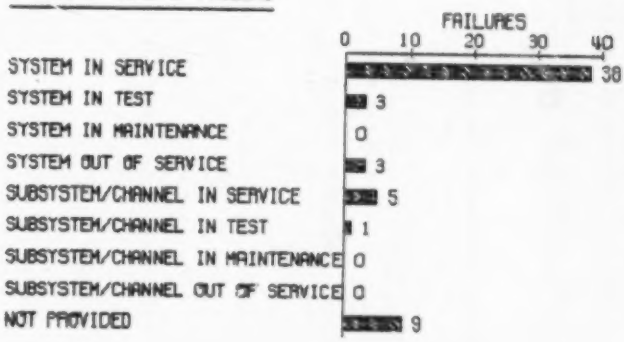
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



MECFUN

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MECHANICAL FUNCTION UNITS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS									
								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS			OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CENTRIFUGAL PUMP TRANSMISSION DEVICE								6	.131 .342	0	2	2
FLEXIBLE COUPLING								65	1.829 3.124	3	21	9
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	5.85		8		8	8	8
OUT OF LIMITS	2	2	.00	.00	.00	.00	17.56		237		298	237	175
TOTAL	3	3	.00	.00	.00	.69	17.56		160		298	160	8
GEARED CONTROLLER OR GOVERNOR								31	.062 1.341	3	3	2
FRACTURE/BREAK	1	1	.00	.00	.50	1.00	1.00		7		7	7	7
SPURIOUS OPERATION	2	1	.00	.00	1.00	2.00	2.00		21		21	21	21
TOTAL	3	1	.00	.00	1.50	3.00	3.00		16		21	16	7
GEARED COUPLING								9	.196 .358	0	4	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 361 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MECHANICAL FUNCTION UNITS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)					OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GEARED POWER TRANSMISSION DEVICE			61				.845	39	12		8
							2.955				
PHYSICAL DISTORTION	1	1	.00	.00	.00	4.39	24		24	24	24
WON'T START/MOVE	17	2	.00	.00	.00	65.84	111		322	111	9
OUT OF LIMITS	4	1	.00	.00	.00	17.56	220		433	220	30
OUT OF ADJUSTMENT	1	1	.00	.00	.00	26.10	41		41	41	41
SPURIOUS OPERATION	12	1	.00	.00	.00	52.67	642		2546	642	44
FALSE RESPONSE	2	1	.00	.00	.00	8.78	730		1458	730	2
OTHER (SEE REMARKS)	2	1	.00	.00	.00	8.78	288		446	288	130
TOTAL	39	3	.00	.00	.00	158.01	322		2546	322	2
MECHANICAL HYDRAULIC CONTROLLER OR GOVERNOR			29				.583	5	15		11
							1.378				
FRACTURE/BREAK	1	1	.00	.00	.00	2.96	6		6	6	6
WON'T START/MOVE	1	1	.00	.00	.00	11.38	1		1	1	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	2.96	6		6	6	6
SPURIOUS OPERATION	1	1	.00	.00	.00	2.96	4		4	4	4
SHORT TO GROUND	1	1	.00	.00	.00	11.38	7		7	7	7
TOTAL	5	2	.00	.00	.00	22.76	5		7	5	1
MECHANICAL HYDRAULIC COUPLING			13				.663	0	6		4
							.784				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MECHANICAL FUNCTION UNITS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	* 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
MECHANICAL HYDRAULIC POWER TRANSMISSION DEVICE								2		.067	0	2	2			
										.099						
MECHANICAL HYDRAULIC UNDEFINED								146		7.256	0	1	1			
										7.996						
OTHER CONTROLLER OR GOVERNOR								13		.003	5	8	4			
										.658						
FALSE RESPONSE	4	3	.00	2.96	2.96	6.54	14.88				167			208	167	95
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	2.96				19			19	19	19
TOTAL	5	3	.00	3.57	3.57	8.02	14.88				137			208	137	19
OTHER COUPLING								14		.656	0	5	5			
										.759						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MECHANICAL FUNCTION UNITS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)			OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER												
POWER TRANSMISSION DEVICE						2	.038		4	1		1
							.131					
FRACTURE/BREAK	4	1	30.44	30.44	30.44	30.44	30.44	22		48	22	3
TOTAL	4	1	30.44	30.44	30.44	30.44	30.44	22		48	22	3
UNDEFINED												
CONTROLLER OR GOVERNOR						19	.001		0	6		4
							.676					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

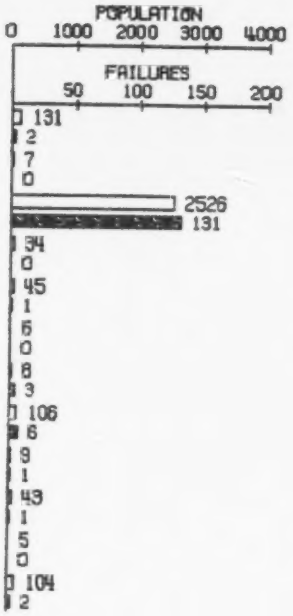
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

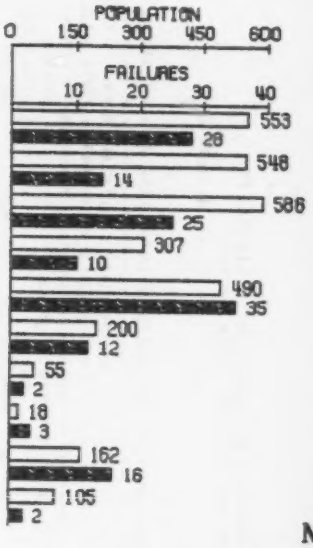
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
MOTORS	3024	136.5347	147	7153	484	0

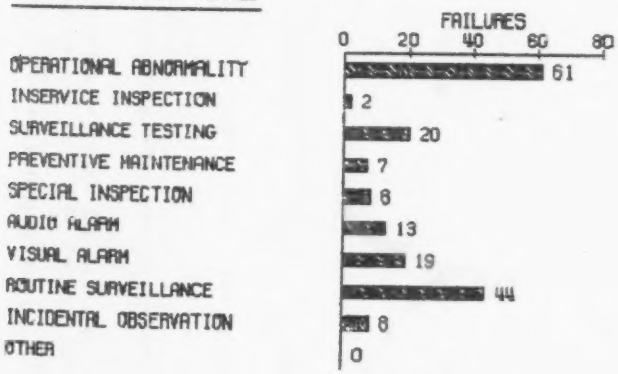
TYPE/CATEGORY



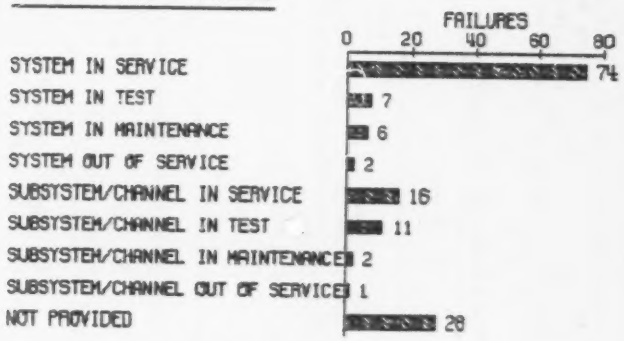
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



MOTORX

FAILURES POPULATION

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MOTORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SYNCHRONOUS 100-299 VDC								4	.133	.133	0	1	1			
SYNCHRONOUS 300 VDC OR HIGHER								6	.040	.200	0	1	1			
SYNCHRONOUS 100-299 VAC SINGLE PHASE								8	.004	.456	0	1	1			
SYNCHRONOUS 100-299 VAC POLYPHASE								4	.219	.228	0	1	1			
SYNCHRONOUS 300-499 VAC POLYPHASE								63	1.123	2.747	1	24	18			
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	17.68			864		864	864	864	864	864
TOTAL	1	1	.00	.00	.00	.00	17.68			864		864	864	864	864	864

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MOTORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SYNCHRONOUS 500-699 VAC POLYPHASE								2	.037		0	1	1			
									.054							
SYNCHRONOUS 3,500-4,999 VAC POLYPHASE								37	.623		0	13	9			
									1.712							
SYNCHRONOUS UNDEFINED								7	.239		1	3	3			
									.321							
MOVE START/MOVE	1	1	.00	.00	.00	23.53	23.53		31		31	31	31			
TOTAL	1	1	.00	.00	.00	23.53	23.53		31		31	31	31			
HYSTERESIS-SYNCHRONOUS 100-299 VDC								1	.033		0	1	1			
									.033							
HYSTERESIS-SYNCHRONOUS 300-499 VAC POLYPHASE								2	--		0	1	1			
									.013							

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

MOTORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HYSTERESIS-SYNCHRONOUS 500-699 VAC POLYPHASE	1	.065	0	1	1
		.065			
HYSTERESIS-SYNCHRONOUS 3,500-4,999 VAC POLYPHASE	3	.020	0	1	1
		.020			
INDUCTION,SQUIRREL CAGE LESS THAN 100 VDC	3	.067	0	2	2
		.154			
INDUCTION,SQUIRREL CAGE 100-299 VDC	38	.095	0	14	10
		1.925			
INDUCTION,SQUIRREL CAGE 100-299 VAC SINGLE PHASE	34	.284	0	5	5
		1.145			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
HYSTERESIS-SYNCHRONOUS 500-699 VAC POLYPHASE											
HYSTERESIS-SYNCHRONOUS 3,500-4,999 VAC POLYPHASE											
INDUCTION,SQUIRREL CAGE LESS THAN 100 VDC											
INDUCTION,SQUIRREL CAGE 100-299 VDC											
INDUCTION,SQUIRREL CAGE 100-299 VAC SINGLE PHASE											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 100-299 VAC POLYPHASE	57	1.007 / 2.230	2	13	10

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	2	1	.00	.00	.00	3.90	17	21	17	13
TOTAL	2	1	.00	.00	.00	3.90	17	21	17	13

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 300-499 VAC POLYPHASE	1485	22.281 / 70.561	74	247	45

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	.30	32	39	32	25
CRACK	2	2	.00	.00	.00	1.39	1000	1272	1000	728
PHYSICAL DISTORTION	7	3	.00	.00	.00	3.15	937	5018	937	89
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.19	309	309	309	309
WON'T START/MOVE	35	9	.00	.00	.00	5.43	592	7153	592	0
WON'T OPEN	4	2	.00	.00	.00	.39	17	52	17	4
WON'T RELEASE	1	1	.00	.00	.00	1.90	123	123	123	123
OUT OF LIMITS	9	2	.00	.00	.00	1.49	332	1003	332	21
OUT OF ADJUSTMENT	1	1	.00	.00	.00	1.05	690	690	690	690
SPURIOUS OPERATION	7	2	.00	.00	.00	1.12	146	552	146	10
FALSE RESPONSE	1	1	.00	.00	.00	.27	30	30	30	30
OTHER (SEE REMARKS)	4	3	.00	.00	.00	1.05	146	277	146	48
TOTAL	74	13	.00	.00	.00	7.35	475	7153	475	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 500-699 VAC POLYPHASE	288	2.043 / 8.529	3	36	7

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	2	1	.00	.00	.00	4.47	830	842	830	818
OUT OF ADJUSTMENT	1	1	.00	.00	.00	2.24	3	3	3	3
TOTAL	3	1	.00	.00	.00	6.70	554	842	554	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 2,000-2,599 VAC POLYPHASE	46	1.260 2.600	6	16	8

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	5	1	.00	.00	.00	.00	8.45	224	759	224	30
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.38	121	121	121	121
TOTAL	6	2	.00	.00	.00	.00	8.45	207	759	207	30

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 3,500-4,999 VAC POLYPHASE	446	7.565 20.360	28	156	50

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	3	3	.00	.00	.00	.00	2.40	172	296	172	2
CRACK	1	1	.00	.00	.00	.00	.64	3622	3622	3622	3622
PHYSICAL DISTORTION	3	3	.00	.00	.00	.00	3.80	30	55	30	6
PHYSICAL DISPLACEMENT	2	2	.00	.00	.00	.00	1.94	1323	1735	1323	911
WON'T START/MOVE	6	5	.00	.00	.00	.00	65.20	565	2609	565	86
WON'T STOP	1	1	.00	.00	.00	.00	3.67	672	672	672	672
OUT OF LIMITS	4	3	.00	.00	.00	.00	7.33	272	527	272	6
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	1.76	119	190	119	48
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.76	2	2	2	2
VIBRATION	1	1	.00	.00	.00	.00	2.55	91	91	91	91
OTHER (SEE REMARKS)	4	3	.00	.00	.00	.00	3.67	401	729	401	165
TOTAL	28	12	.00	.00	.00	.00	65.20	499	3622	499	2

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 6,000-6,999 VAC POLYPHASE	40	1.225 1.736	4	10	10

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	4	3	.00	.00	.00	4.52	7.65	1327	2400	1327	242
TOTAL	4	3	.00	.00	.00	4.52	7.65	1327	2400	1327	242

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE 13,000-13,999 VAC POLYPHASE	4	.057	2	1	1
		.109			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	2	1	18.33	18.33	18.33	18.33	18.33	3	3	3	3
TOTAL	2	1	18.33	18.33	18.33	18.33	18.33	3	3	3	3

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE OTHER	21	.797	0	6	2
		1.279			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
NO FAILURES REPORTED											

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SQUIRREL CAGE UNDEFINED	64	1.282	12	20	8
		3.067			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.73	56	56	56	56
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.73	656	656	656	656
WON'T HOLD	1	1	.00	.00	.00	.00	.73	823	823	823	823
OUT OF LIMITS	2	2	.00	.00	.00	.00	6.01	40	72	40	8
OUT OF ADJUSTMENT	4	1	.00	.00	.00	.00	2.91	76	175	76	13
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.73	317	317	317	317
FALSE RESPONSE	1	1	.00	.00	.00	.00	.73	4	4	4	4
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.73	192	192	192	192
TOTAL	12	3	.00	.00	.00	.00	7.27	203	823	203	4

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
INDUCTION,SLIP RING 100-299 VDC	4	.112	0	1	1
		.225			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
NO FAILURES REPORTED											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
INDUCTION,SLIP RING 300-499 VAC POLYPHASE								.446 / .780	22		0	4	2			
INDUCTION,SLIP RING 3,500-4,999 VAC POLYPHASE								-- / .007	1		0	1	1			
INDUCTION,SLIP RING UNDEFINED								.208 / .386	7		0	3	3			
INDUCTION,REPULSION START 300-499 VAC POLYPHASE								.887 / 1.575	30		1	10	5			
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	5.85	55			55	55	55	55	55	55
TOTAL	1	1	.00	.00	.00	.00	5.85	55			55	55	55	55	55	55
INDUCTION,REPULSION START 500-699 VAC POLYPHASE								.024 / .095	3		0	2	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	* LOWEST
INDUCTION,REPULSION START																
3,500-4,999 VAC POLYPHASE								12	.075	.666	0	3	3			
CAPACITOR START																
100-299 VAC SINGLE PHASE								1	--	.033	0	1	1			
CAPACITOR START																
100-299 VAC POLYPHASE								2	.055	.114	0	1	1			
CAPACITOR START																
300-499 VAC POLYPHASE								3	.164	.171	0	1	1			
SPLIT PHASE																
100-299 VAC SINGLE PHASE								2	.110	.114	0	1	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SPLIT PHASE 300-499 VAC POLYPHASE			4	.015 .165	2	2	2
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	1	1	.00 .00	4.53	9.07	9.07	144	144	144	144
PHYSICAL DISTURTION	1	1	.00 .00	4.53	9.07	9.07	3000	3000	3000	3000
TOTAL	2	1	.00 .00	9.06	18.13	18.13	1572	3000	1572	144
SPLIT PHASE 3,500-4,999 VAC POLYPHASE			2	.063 .102	1	1	1
PHYSICAL DISPLACEMENT	1	1	9.78 9.78	9.78	9.78	9.78	61	61	61	61
TOTAL	1	1	9.78 9.78	9.78	9.78	9.78	61	61	61	61
DC COMMUTATOR,SINGLE SPEED 100-299 VDC			99	.517 5.085	4	36	19
WON'T START/MOVE	2	2	.00 .00	.00	.00	24.03	144	192	144	96
WON'T OPEN	3	1	.00 .00	.00	.00	1.88	21	34	21	4
OUT OF ADJUSTMENT	1	1	.00 .00	.00	.00	4.73	30	30	30	30
TOTAL	6	4	.00 .00	.00	.00	24.03	63	192	63	4
DC COMMUTATOR,SINGLE SPEED 100-299 VAC SINGLE PHASE			3	.009 .121	0	2	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
DC COMMUTATOR, SINGLE SPEED 100-299 VAC POLYPHASE							2		0	1	1	--			
												.110			
DC COMMUTATOR, SINGLE SPEED 300-499 VAC POLYPHASE							2		0	1	1	--			
												.081			
DC COMMUTATOR, VARIABLE SPEED 100-299 VDC							8		1	6	4	.027			
												.332			
MOV'T START/MOVE	1	1	.00	.00	.00	6.37			4	4	4		4	4	4
TOTAL	1	1	.00	.00	.00	6.37			4	4	4		4	4	4
DC COMMUTATOR, VARIABLE SPEED 300 VDC OR HIGHER							1		0	1	1	.056			
												.056			
PNEUMATIC 300-499 VAC POLYPHASE							2		0	1	1	.110			
												.114			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
												OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PNEUMATIC OTHER								--	1		1	1	1
								.057					
SPURIOUS OPERATION	1	1	17.55	17.55	17.55	17.55	17.55	820				820	820	820
TOTAL	1	1	17.55	17.55	17.55	17.55	17.55	820				820	820	820
PNEUMATIC UNDEFINED								.001	40		0	3	3
								1.881					
OTHER 300-499 VAC POLYPHASE								.179	5		0	1	1
								.190					
UNDEFINED 100-299 VDC								--	12		1	2	2
								.374					
WON'T START/MOV=	1	1	.00	.00	2.71	5.43	5.43	3632				3632	3632	3632
TOTAL	1	1	.00	.00	2.71	5.43	5.43	3632				3632	3632	3632

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED 100-299 VAC SINGLE PHASE	6	-- .184	0	1	1
UNDEFINED 100-299 VAC POLYPHASE	9	-- .276	0	1	1
UNDEFINED 300-499 VAC POLYPHASE	33	.739 1.346	0	10	3
UNDEFINED 500-699 VAC POLYPHASE	4	-- .126	0	1	1
UNDEFINED 2,000-2,599 VAC POLYPHASE	11	.228 .626	1	5	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MINIMUM	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER (SEE REMARKS)	1	1	1.60	1.60	1.60	1.60	1.60	2279	2279	2279	2279
TOTAL	1	1	1.60	1.60	1.60	1.60	1.60	2279	2279	2279	2279

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED 3,500-4,999 VAC POLYPHASE	15	--	0	6	5
		.718			
UNDEFINED OTHER	1	.031	0	1	1
		.031			
UNDEFINED UNDEFINED	13	.303	0	4	3
		.516			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
UNDEFINED 3,500-4,999 VAC POLYPHASE								--			
UNDEFINED OTHER								.031			
UNDEFINED UNDEFINED								.303			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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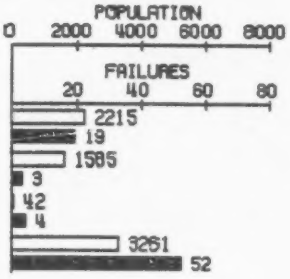
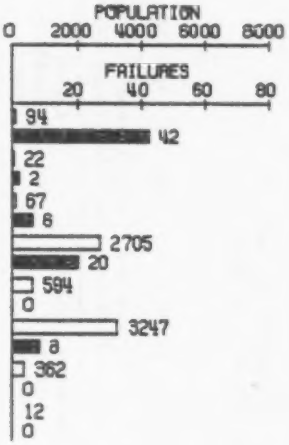
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PENETRATIONS, PRIMARY CONT.	7103	339.7585	78	4856	327	0

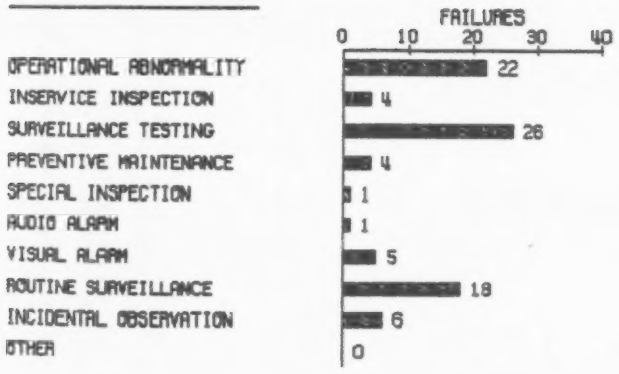
TYPE/CATEGORY



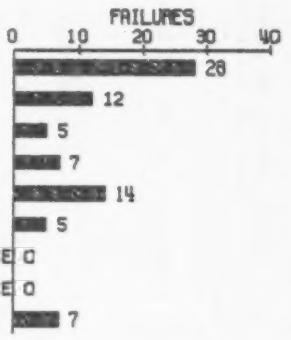
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



PENETR

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PENETRATIONS, PRIMARY CONT.

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			2215	82.992	19	57	24
				96.435			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	6	4	.00	.00	.00	.00	44.40	15	59	15	0
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.21	56	56	56	56
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.69	16	16	16	16
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.31	47	47	47	47
WON'T CLOSE	2	1	.00	.00	.00	.00	.63	0	0	0	0
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.21	13	13	13	13
FALSE RESPONSE	6	2	.00	.00	.00	.00	.82	81	377	81	6
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.69	16	16	16	16
TOTAL	19	6	.00	.00	.00	.00	44.40	38	377	38	0

CARTRIDGE											
						1585		52.751	3	19	18
								63.770			
LEAK	3	2	.00	.00	.00	.00	.42	434	623	434	103
TOTAL	3	2	.00	.00	.00	.00	.42	434	623	434	103

OTHER											
						42		1.215	4	4	4
								1.227			
LEAK	4	2	.00	.00	.00	2.50	15.21	213	696	213	6
TOTAL	4	2	.00	.00	.00	2.50	15.21	213	696	213	6

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PENETRATIONS, PRIMARY CONT.

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED	3261	131.770 178.327	52	109	40

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	21	9	.00	.00	.00	.00	.78	276	1352	276	2
CRACK	2	1	.00	.00	.00	.00	.35	4856	4856	4856	4856
PHYSICAL DISTORTION	5	4	.00	.00	.00	.00	12.59	26	48	26	2
FRACTURE/BREAK	2	2	.00	.00	.00	.00	10.86	109	192	109	26
WON'T START/MOVE	2	2	.00	.00	.00	.00	10.86	19	32	19	6
WON'T CLOSE	6	4	.00	.00	.00	.00	18.26	266	1300	266	7
WON'T OPEN	4	2	.00	.00	.00	.00	18.26	6	9	6	2
OUT OF LIMITS	1	1	.00	.00	.00	.00	.47	1038	1038	1038	1038
OUT OF ADJUSTMENT	7	4	.00	.00	.00	.00	18.88	274	1614	274	5
OTHER (SEE REMARKS)	2	2	.00	.00	.00	.00	4.39	1071	2134	1071	8
TOTAL	52	17	.00	.00	.00	.00	45.64	435	4856	435	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

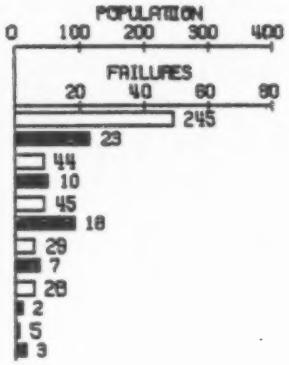
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

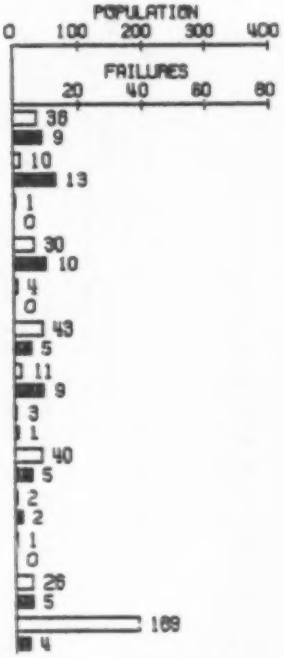
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PIPES. FITTINGS	396	16.1584	63	7811	1883	1

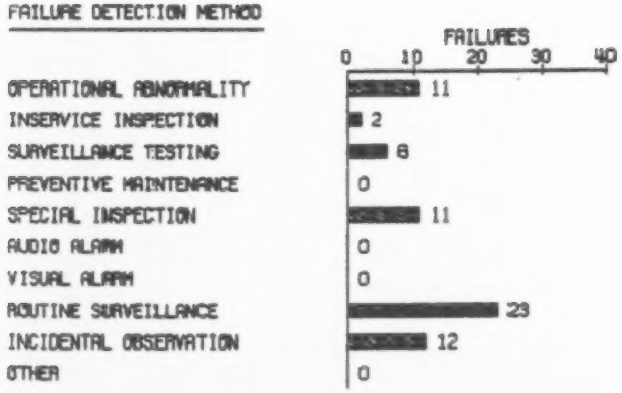
TYPE/CATEGORY



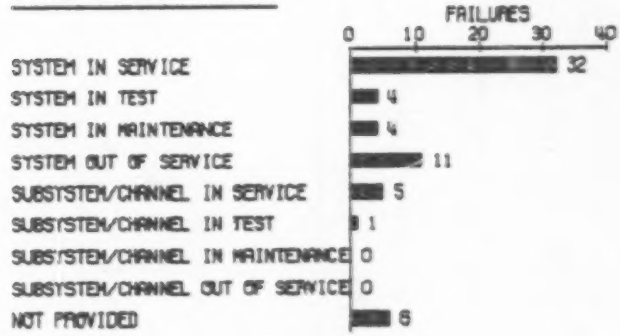
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

PIPEX

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 1/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS									
								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LESS THAN 4 IN. STRAIGHT SECTION.						48		2.230		15	9	7
								2.613				
LEAK	3	2	.00	.00	.00	17.56	18.91	89		165	89	28
CRACK	3	1	.00	.00	.00	.00	34.13	11		26	11	1
SPURIOUS OPERATION	9	1	.00	.00	.00	.00	4.39	1950		1950	1950	1950
TOTAL	15	4	.00	.00	4.39	18.91	34.13	1190		1950	1190	1
LESS THAN 4 IN. ELBOW						3		.123		2	3	3
								.169				
LEAK	1	1	.00	.00	.00	17.56	17.56	10		10	10	10
CRACK	1	1	.00	.00	.00	17.56	17.56	2		2	2	2
TOTAL	2	2	.00	.00	17.56	17.56	17.56	6		10	6	2
LESS THAN 4 IN. TEE						2		.094		3	2	2
								.095				
LEAK	3	2	26.29	26.29	30.70	35.12	35.12	116		336	116	6
TOTAL	3	2	26.29	26.29	30.70	35.12	35.12	116		336	116	6
LESS THAN 4 IN. REDUCER/ORIFICE						23		.040		0	6	3
								.975				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
LESS THAN 4 IN. NUZZLE/SAFE IND			2	.057 .112	1	2	2
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	1	1	.00	8.78	17.56	17.56	195	195	195	195
TOTAL	1	1	.00	8.78	17.56	17.56	195	195	195	195
LESS THAN 4 IN. THERMOWELL			9	.250 .458	0	3	3
LESS THAN 4 IN. CONNECTING WELD			3	.088 .180	2	3	2
LEAK	2	2	8.78	11.99	15.21	15.21	809	1608	809	8
TOTAL	2	2	8.78	11.99	15.21	15.21	809	1608	809	8
LESS THAN 4 IN. RUPTURE DIAPHRAGM			137	3.906 3.906	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM ANY INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM ANY INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
LESS THAN 4 IN. OTHER			18	.500	0	4	2
				.769			
4 TO 6 IN. STRAIGHT SECTION.			8	.342	6	6	6
				.373			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	17.56	18.91	37	68	37	5
CRACK	4	3	.00	.00	9.12	22.76	30.43	706	2308	706	6
TOTAL	6	5	.00	17.56	18.58	22.76	30.43	483	2308	483	5
4 TO 6 IN. ELBOW						1		.053	1	1	1
								.053			
CRACK	1	1	19.01	19.01	19.01	19.01	19.01	141	141	141	141
TOTAL	1	1	19.01	19.01	19.01	19.01	19.01	141	141	141	141
4 TO 6 IN. TEE						2		.056	1	1	1
								.056			
FRACTURE/BREAK	1	1	17.83	17.83	17.83	17.83	17.83	162	162	162	162
TOTAL	1	1	17.83	17.83	17.83	17.83	17.83	162	162	162	162

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
4 TO 6 IN. REDUCER/ORIFICE			4				.114	0	1	1
							.114			
4 TO 6 IN. NOZZLE/SAFE IND			2				.092	2	2	2
							.095			
LEAK	1	1	.00	.00	13.32	26.64	26.64	264	264	264	264
CRACK	1	1	.00	.00	8.77	17.55	17.55	283	283	283	283
TOTAL	2	2	17.55	17.55	22.09	26.64	26.64	274	283	274	264
4 TO 6 IN. CONNECTING WELD			4				.199	0	3	3
							.224			
4 TO 6 IN. RUPTURE DIAPHRAGM			3				--	0	1	1
							.142			
4 TO 6 IN. OTHER			20				.845	0	4	2
							.964			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
6 TO 10 IN. STRAIGHT SECTION.			6	.267 .333	4	6	4
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	8.77	18.91	951	1411	951	490
CRACK	2	2	.00	.00	.00	3.00	17.56	607	720	607	493
TOTAL	4	4	6.01	11.78	11.78	17.55	18.91	779	1411	779	490
6 TO 10 IN. REDUCER/ORIFICE			6	.070 .180	0	4	4
6 TO 10 IN. NOZZLE/SAFE IND			1	.057 .057	1	1	1
CRACK	1	1	17.55	17.55	17.55	17.55	17.55	1198	1198	1198	1198
TOTAL	1	1	17.55	17.55	17.55	17.55	17.55	1198	1198	1198	1198
6 TO 10 IN. THERMOWELL			4	.219 .228	4	2	1
LEAK	4	1	17.55	17.55	17.55	17.55	17.55	2	2	2	2
TOTAL	4	1	17.55	17.55	17.55	17.55	17.55	2	2	2	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
6 TO 10 IN. CONNECTING WELD	9	.517 .513	9	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	9	1	17.56	17.56	17.56	17.56	17.56	528	528	528	528
TOTAL	9	1	17.56	17.56	17.56	17.56	17.56	528	528	528	528

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
6 TO 10 IN. RUPTURE DIAPHRAGM	15	.171 .729	0	8	8
6 TO 10 IN. OTHER	2	.075 .092	0	2	2
6 TO 10 IN. UNDEFINED	2	.131 .131	0	1	1
10 TO 16 IN. STRAIGHT SECTION.	4	.765 .299	4	3	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	4	1	.00	.00	.00	75.62	75.62	422	1198	422	15
TOTAL	4	1	.00	.00	.00	75.62	75.62	422	1198	422	15

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 1/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY / AVERAGE RESTORATION HOURS	OP/CALENDAR HOURS(MILLIONS) / TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS / OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
10 TO 16 IN. TEE								1	--	1	1		1
									.057				
CRACK	1	1	17.56	17.56	17.56	17.56	17.56		294		294	294	294
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56		294		294	294	294
10 TO 16 IN. REDUCER/ORIFICE								4	.027	0	1		1
									.027				
10 TO 16 IN. NUZZLE/SAFE IND								1	.057	1	1		1
									.057				
CRACK	1	1	17.56	17.56	17.56	17.56	17.56		73		73	73	73
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56		73		73	73	73
10 TO 16 IN. RUPTURE DIAPHRAGM								17	.302	1	8		8
									.941				
LEAK	1	1	.00	.00	.00	.00	6.67		19		19	19	19
TOTAL	1	1	.00	.00	.00	.00	6.67		19		19	19	19

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
16 IN AND LARGER STRAIGHT SECTION.	15	.554 .679	1	4	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	1	1	.00	.00	.00	15.22	15.22	46	46	46	46
TOTAL	1	1	.00	.00	.00	15.22	15.22	46	46	46	46

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
16 IN AND LARGER ELBOW	8	.267 .352	0	1	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
16 IN AND LARGER TEE	1	.045 .057	1	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	1	1	17.55	17.55	17.55	17.55	17.55	121	121	121	121
TOTAL	1	1	17.55	17.55	17.55	17.55	17.55	121	121	121	121

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
16 IN AND LARGER REDUCER/ORIFICE	2	.013 .013	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
1o IN AND LARGER RUPTURE DIAPHRAGM								1		--	0	1	1			
										.057						
1o IN AND LARGER OTHER								1		.017	0	1	1			
										.033						
UNDEFINED NOZZLE/SAFE IND								1		--	0	1	1			
										.033						
UNDEFINED THERMOWELL								2		.076	2	1	1			
										.106						
LEAK	2	1	18.91	18.91	18.91	18.91	18.91			59		70	59	48		
TOTAL	2	1	18.91	18.91	18.91	18.91	18.91			59		70	59	48		
UNDEFINED CONNECTING WELD								1		.057	1	1	1			
										.057						
CRACK	1	1	17.56	17.56	17.56	17.56	17.56			7811		7811	7811	7811		
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56			7811		7811	7811	7811		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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PIPES, FITTINGS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED UNDEFINED	1	.013 .031	0	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

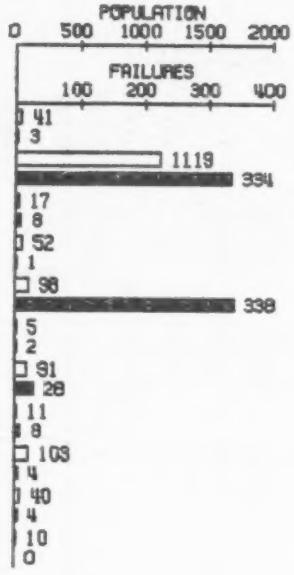
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

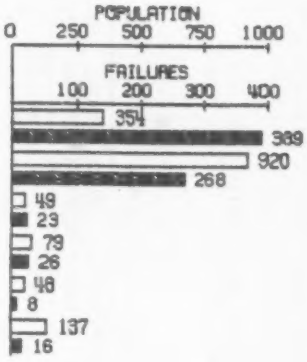
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PUMPS	1587	75.0191	730	7926	294	0

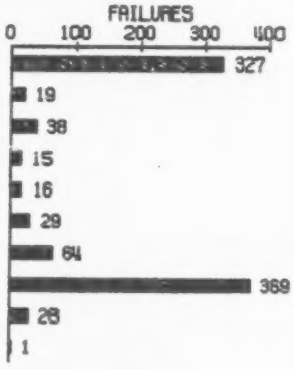
TYPE/CATEGORY



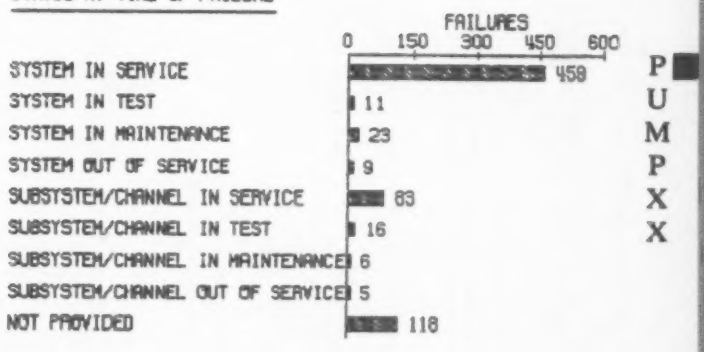
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES POPULATION

NPRD REPORT A03 (PART 2)
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
AXIAL UNDER 500 GPM			28	.427	2	13	13
				1.466			
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T OPEN	1	1	.00 .00	.00	.00	15.22	432	432	432	432
SPURIOUS OPERATION	1	1	.00 .00	.00	.00	7.61	814	814	814	814
TOTAL	2	2	.00 .00	.00	.00	15.22	623	814	623	432
AXIAL 2500-9999 GPM			4	.020	1	3	2
				.202			
LEAK	1	1	.00 .00	16.28	32.57	32.57	26	26	26	26
TOTAL	1	1	.00 .00	16.28	32.57	32.57	26	26	26	26
AXIAL OVER 50,000 GPM			2	.114	0	1	1
				.129			
AXIAL UNDEFINED			7	.020	0	2	2
				.220			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CENTRIFUGAL UNDER 500 GPM	361	6.151 17.700	131	132	51

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	47	15	.00	.00	3.26	18.15	449	4010	449	2
CRACK	3	3	.00	.00	.00	4.73	2645	7228	2645	94
BREACH	3	2	.00	.00	.00	1.53	993	2907	993	31
PHYSICAL DISTORTION	9	7	.00	.00	.00	10.87	662	3104	662	2
PHYSICAL DISPLACEMENT	3	2	.00	.00	.00	1.98	113	243	113	22
FRACTURE/BREAK	7	4	.00	.00	.00	13.42	1503	7926	1503	1
WON'T START/MOVE	23	10	.00	.00	.00	10.87	374	2956	374	0
WON'T STOP	1	1	.00	.00	.00	6.11	672	672	672	672
OUT OF LIMITS	13	5	.00	.00	.00	13.42	140	677	140	3
OUT OF ADJUSTMENT	1	1	.00	.00	.00	4.73	920	920	920	920
SPURIOUS OPERATION	12	4	.00	.00	.00	4.56	444	1485	444	0
FALSE RESPONSE	2	2	.00	.00	.00	3.26	25	27	25	23
OTHER (SEE REMARKS)	7	6	.00	.00	.00	9.13	1306	5115	1306	0
TOTAL	131	24	.00	.00	.00	8.08	44.75	575	7926	575	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CENTRIFUGAL 500-2499 GPM	169	1.716 7.958	43	88	46

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	11	6	.00	.00	.00	.00	19.12	200	792	200	2
CRACK	2	1	.00	.00	.00	.00	7.02	169	241	169	97
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	4.73	9	9	9	9
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	2.93	353	353	353	353
FRACTURE/BREAK	1	1	.00	.00	.00	.00	4.95	145	145	145	145
WON'T START/MOVE	8	3	.00	.00	.00	.00	24.44	15	46	15	1
OUT OF LIMITS	8	6	.00	.00	.00	.00	18.33	128	243	128	16
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	4.95	7	7	7	7
SPURIOUS OPERATION	4	3	.00	.00	.00	.00	12.22	50	186	50	1
FALSE RESPONSE	1	1	.00	.00	.00	.00	5.95	0	0	0	0
OTHER (SEE REMARKS)	5	3	.00	.00	.00	.00	17.55	97	432	97	4
TOTAL	43	15	.00	.00	.00	3.80	61.11	114	792	114	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PUMPS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CENTRIFUGAL 2500-9999 GPM	339	3.141 / 15.615	66	111	50

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	31	11	.00	.00	.00	.00	19.31	815	7050	815	4
CRACK	10	3	.00	.00	.00	.00	14.04	341	1304	341	5
PHYSICAL DISTORTION	4	3	.00	.00	.00	.00	12.22	45	70	45	3
PHYSICAL DISPLACEMENT	3	3	.00	.00	.00	.00	3.36	45	81	45	13
WON'T START/MOVE	4	4	.00	.00	.00	.00	8.15	786	1857	786	0
OUT OF LIMITS	5	4	.00	.00	.00	.00	12.22	212	527	212	5
SPURIOUS OPERATION	6	1	.00	.00	.00	.00	10.53	1146	6124	1146	18
OTHER (SEE REMARKS)	3	3	.00	.00	.00	.00	15.30	392	1343	544	12
TOTAL	66	20	.00	.00	.00	4.52	49.15	632	7050	632	0

CENTRIFUGAL 10,000-50,000 GPM	109	3.603 / 5.165	22	37	29

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	18	6	.00	.00	.00	.00	60.86	217	1074	217	26
COLLAPSE	1	1	.00	.00	.00	.00	3.51	97	97	97	97
FRACTURE/BREAK	1	1	.00	.00	.00	.00	16.30	72	72	72	72
WON'T START/MOVE	1	1	.00	.00	.00	.00	7.33	96	96	96	96
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	7.33	729	729	729	729
TOTAL	22	7	.00	.00	.00	.00	60.86	223	1074	223	26

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CENTRIFUGAL OVER >0,000 GPM	113	3.555 4.998	68	34	33

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	47	15	.00	.00	.00	17.07	45.20	339	3494	339	13
CRACK	3	3	.00	.00	.00	.00	9.46	918	2488	918	81
PHYSICAL DISTORTION	3	3	.00	.00	.00	.00	8.14	169	224	169	88
PHYSICAL DISPLACEMENT	2	2	.00	.00	.00	.00	9.46	134	143	134	125
COLLAPSE	1	1	.00	.00	.00	.00	4.73	207	207	207	207
FRACTURE/BREAK	1	1	.00	.00	.00	.00	15.21	341	341	341	341
WON'T START/MOVE	2	1	.00	.00	.00	.00	18.33	3	3	3	3
WON'T CLOSE	1	1	.00	.00	.00	.00	9.17	1	1	1	1
WON'T HOLD	3	1	.00	.00	.00	.00	14.18	174	204	174	159
OUT OF LIMITS	1	1	.00	.00	.00	.00	4.72	306	306	306	306
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	17.55	1175	2346	1175	3
OTHER (SEE REMARKS)	2	2	.00	.00	.00	.00	7.51	725	1440	725	9
TOTAL	68	18	.00	.00	5.05	22.76	55.00	362	3494	362	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CENTRIFUGAL UNDEFINED	29	.571 1.187	4	13	12

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	4	1	.00	.00	.00	.00	21.30	226	226	226	226
TOTAL	4	1	.00	.00	.00	.00	21.30	226	226	226	226

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIAPHRAGM UNDER 500 GPM	11	.155 .627	7	2	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	1.60	1.60	1.60	1.60	1.60	271	271	271	271
PHYSICAL DISPLACEMENT	1	1	1.60	1.60	1.60	1.60	1.60	12	12	12	12
SPURIOUS OPERATION	5	1	7.98	7.98	7.98	7.98	7.98	1003	3652	1003	30
TOTAL	7	1	11.17	11.17	11.17	11.17	11.17	757	3652	757	12

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
COMPONENTS IN CATEGORY: 2 — OP/CALENDAR HOURS (MILLIONS): .055 / .114 — OUT-OF-SERVICE HOURS: HIGHEST 1, AVERAGE 1, LOWEST 1											
DIAPHRAGM 500-2,99* GPM											
LEAK	1	1	8.78	8.78	8.78	8.78	8.78	42	42	42	42
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78	42	42	42	42
COMPONENTS IN CATEGORY: 3 — OP/CALENDAR HOURS (MILLIONS): .100 / .125 — OUT-OF-SERVICE HOURS: HIGHEST 0, AVERAGE 1, LOWEST 1											
DIAPHRAGM 10,000-50,000 GPM											
COMPONENTS IN CATEGORY: 1 — OP/CALENDAR HOURS (MILLIONS): -- / .055 — OUT-OF-SERVICE HOURS: HIGHEST 0, AVERAGE 1, LOWEST 1											
DIAPHRAGM UNDEFINED											
COMPONENTS IN CATEGORY: 48 — OP/CALENDAR HOURS (MILLIONS): .553 / 2.537 — OUT-OF-SERVICE HOURS: HIGHEST 13, AVERAGE 13, LOWEST 12											
GEAR UNDER 500 GPM											
LEAK	1	1	.00	.00	.00	.00	15.01	1230	1230	1230	1230
TOTAL	1	1	.00	.00	.00	.00	15.01	1230	1230	1230	1230

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GEAR							
500-2499 GPM			2	.001	0	1	1
				.114			
GEAR							
UNDEFINED			2	.057	0	2	2
				.088			
RECIPROCATING							
UNDER 500 GPM			87	1.478	335	35	34
				4.034			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUP	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	259	17	.00	.00	2.92	32.60	383.89	135	4933	135	1
CRACK	11	5	.00	.00	.00	.00	29.08	179	1128	179	5
BREACH	1	1	.00	.00	.00	.00	3.20	72	72	72	72
PHYSICAL DISTORTION	5	4	.00	.00	.00	.00	10.14	538	2403	538	17
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	8.78	456	456	456	456
COLLAPSE	1	1	.00	.00	.00	.00	4.38	192	192	192	192
FRACTURE/BREAK	26	5	.00	.00	.00	.00	50.72	56	156	56	5
WON'T START/MOVE	3	2	.00	.00	.00	.00	10.14	34	54	34	0
OUT OF LIMITS	9	7	.00	.00	.00	.00	10.14	96	384	96	3
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	5.07	96	96	96	96
SPURIOUS OPERATION	10	6	.00	.00	.00	.00	20.29	141	576	141	18
FALSE RESPONSE	2	2	.00	.00	.00	.00	4.38	294	516	294	72
OTHER (SEE REMARKS)	5	5	.00	.00	.00	.00	18.25	347	1702	347	32
TOTAL	335	19	.00	.00	7.31	70.21	437.76	140	4933	140	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS		NUMBER OF UNITS
												OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
RECIPROCATING 500-2499 GPM									5	.076	1	2		2
										.242				
WON'T START/MOVE	1	1	.00	.00	3.15	6.31	6.31	95						
TOTAL	1	1	.00	.00	3.15	6.31	6.31	95				95	95	95
RECIPROCATING UNDEFINED									6	.163	2	4		4
										.289				
WON'T START/MOVE	2	1	.00	.00	.00	.00	30.03	10						
TOTAL	2	1	.00	.00	.00	.00	30.03	10				12	10	8
RADIAL UNDER 500 GPM									5	.122	2	2		2
										.320				
LEAK	1	1	.00	.00	1.90	3.80	3.80	125						
PHYSICAL DISTORTION	1	1	.00	.00	1.90	3.80	3.80	97						
TOTAL	2	1	.00	.00	3.80	7.61	7.61	111				125	111	97

best copy available

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 1/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

PUMPS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			65	.903	23	16	12
				2.668			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	7	2	.00	.00	.00	.00	17.56	124	355	124	22
PHYSICAL DISTORTION	4	2	.00	.00	.00	.00	6.01	28	67	28	8
FRACTURE/BREAK	1	1	.00	.00	.00	.00	2.93	18	18	18	18
WON'T START/MOVE	5	3	.00	.00	.00	.00	8.78	110	292	110	0
SPURIOUS OPERATION	4	1	.00	.00	.00	.00	11.70	53	97	53	26
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	5.85	60	69	60	50
TOTAL	23	5	.00	.00	.00	.00	52.66	81	355	81	0

ROTARY
500-2499 GPM

COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
1	--	0	1	1
	.066			

ROTARY
2500-9999 GPM

COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
5	.102	2	3	3
	.280			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	6.02	6.02	809	808	809	808
BREACH	1	1	.00	.00	.00	6.02	6.02	16	16	16	16
TOTAL	2	1	.00	.00	.00	12.03	12.03	412	808	412	16

ROTARY
OVER 50,000 GPM

COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
2	.110	0	1	1
	.114			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PUMPS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
ROTARY																
UNDEFINED									19							
								.193			3	8	6			
								.751								
SPURIOUS OPERATION	3	1	.00	.00	.00	.00	10.53									
TOTAL	3	1	.00	.00	.00	.00	10.53				0	0	0	0	0	0
VANE TYPE																
UNDER 500 GPM									9							
								.186			7	2	2			
								.409								
WON'T START/MOVE	4	1	.00	.00	35.10	70.20	70.20				99	184	99	34		
OUT OF LIMITS	1	1	.00	.00	8.77	17.55	17.55				107	107	107	107		
SPURIOUS OPERATION	2	1	.00	.00	17.55	35.10	35.10				20	28	20	11		
TOTAL	7	1	.00	.00	61.42	122.85	122.85				78	184	78	11		
VANE TYPE																
UNDEFINED									2							
								.057			1	2	1			
								.114								
PHYSICAL DISPLACEMENT	1	1	8.78	8.78	8.78	8.78	8.78				2	2	2	2		
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78				2	2	2	2		
JET																
UNDER 500 GPM									1							
								--			0	1	1			
								.057								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PUMPS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
JET 2500-9999 GPM	20	1.140	0	1	1
		1.140			
JET UNDEFINED	82	3.166	4	7	7
		3.940			
OTHER UNDER 500 GPM	12	.235	0	4	3
		.635			
OTHER 2500-9999 GPM	25	.416	4	7	7
		1.215			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	2	1	.00	.00	.00	.00	3.51	355	355	355	355
FRACTURE/BREAK	2	2	.00	.00	.00	1.76	1.76	929	1279	929	578
TOTAL	4	2	.00	.00	.00	1.76	5.27	642	1279	642	355
LEAK	3	2	.00	.00	.00	6.30	10.14	285	437	285	199
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	6.30	68	68	68	68
TOTAL	4	2	.00	.00	.00	10.14	12.61	231	437	231	68

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PUMPS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	CP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER UNDEFINED	3	--	0	3	3
		.141			
UNDEFINED 10,000-50,000 GPM	6	--	0	1	1
		.184			
UNDEFINED UNDEFINED	4	.053	0	1	1
		.123			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

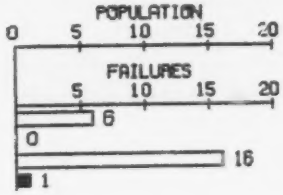
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

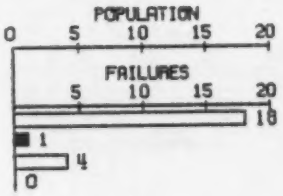
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
RECOMBINERS	22	.8743	1	1697	1697	1697

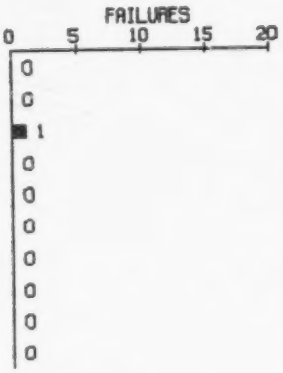
TYPE/CATEGORY



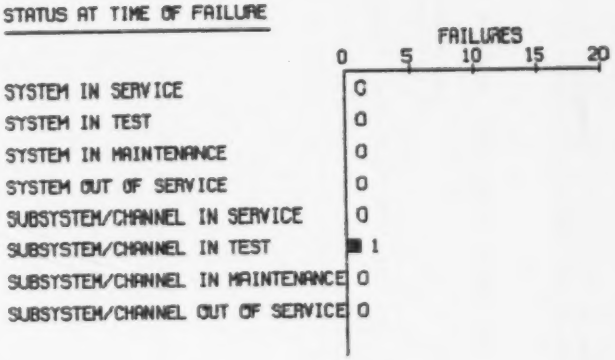
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



RECOMB

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

RECOMBINERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	75 TH PERCENTILE	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FLAME			6	.167	0	3	3
				.285			
THERMAL			16	.001	1	8	8
				.589			
OUT OF LIMITS	1	1	.00 .00 .00 .00 8.78	1697	1697	1697	1697
TOTAL	1	1	.00 .00 .00 .00 8.78	1697	1697	1697	1697

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

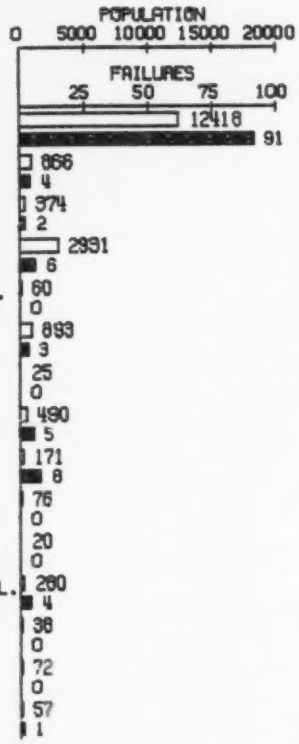
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

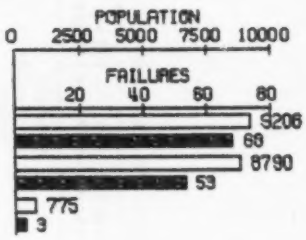
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
RELAYS	18771	886.5434	124	5435	138	0

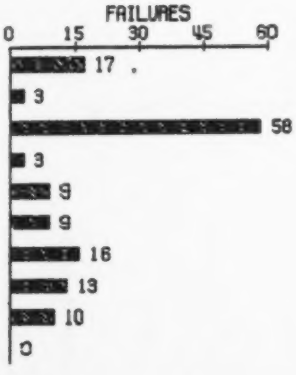
TYPE/CATEGORY



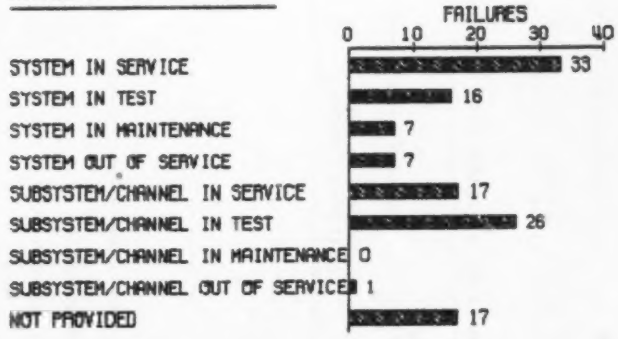
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



RELAYX

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

RELAYS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CONTROL,GENERAL PURPOSE LESS THAN 50 VAC						11		.464 .548	1	2	2
WON'T OPEN	1	1	.00	.00	1.09	2.19	2.19	4	4	4	4
TOTAL	1	1	.00	.00	1.09	2.19	2.19	4	4	4	4
CONTROL,GENERAL PURPOSE 100-199 VAC						3705		95.627 162.356	30	63	26
WON'T CLOSE	3	3	.00	.00	.00	.00	17.94	23	39	23	6
WON'T OPEN	1	1	.00	.00	.00	.00	.23	20	20	20	20
OUT OF LIMITS	5	3	.00	.00	.00	.00	35.88	60	128	60	1
SPURIOUS OPERATION	7	1	.00	.00	.00	.00	1.29	920	5435	920	8
FALSE RESPONSE	3	2	.00	.00	.00	.00	.47	351	1024	351	4
OVERHEATING	2	1	.00	.00	.00	.00	.27	5	8	5	1
SHORT	1	1	.00	.00	.00	.00	.14	896	896	896	896
OTHER (SEE REMARKS)	8	3	.00	.00	.00	.00	.86	216	384	216	8
TOTAL	30	7	.00	.00	.00	.27	53.82	350	5435	350	1
CONTROL,GENERAL PURPOSE 200-300 VAC						3411		40.943 181.853	11	33	17
WON'T CLOSE	5	5	.00	.00	.00	.10	17.56	35	141	35	1
WON'T OPEN	1	1	.00	.00	.00	.00	.24	1	1	1	1
SPURIOUS OPERATION	3	3	.00	.00	.00	.00	17.55	7	9	7	4
FALSE RESPONSE	1	1	.00	.00	.00	.00	.17	4	4	4	4
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.17	240	240	240	240
TOTAL	11	9	.00	.00	.00	.24	17.56	40	240	40	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

RELAYS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
CONTROL,GENERAL PURPOSE OVER 300 VAC									240	2.332	1	12	10			
								9.038								
OUT OF LIMITS	1	1	.00	.00	.00	.00	17.56	134						134	134	134
TOTAL	1	1	.00	.00	.00	.00	17.56	134						134	134	134
CONTROL,GENERAL PURPOSE LESS THAN 50 VDC									13	.660	0	4	3			
								.700								
CONTROL,GENERAL PURPOSE 100-199 VDC									3760	106.652	32	69	25			
								185.058								
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.26	25						25	25	25
WON'T START/MOVE	7	5	.00	.00	.00	.00	2.93	19						65	19	1
WON'T CLOSE	5	2	.00	.00	.00	.00	2.23	58						94	58	2
WON'T OPEN	1	1	.00	.00	.00	.00	.21	1						1	1	1
OUT OF LIMITS	6	3	.00	.00	.00	.00	.43	359						1300	359	3
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.21	8						8	8	8
SPURIOUS OPERATION	3	3	.00	.00	.00	.00	.74	70						202	70	3
FALSE RESPONSE	7	3	.00	.00	.00	.00	.43	175						422	175	10
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	.95	1						1	1	1
TOTAL	32	10	.00	.00	.00	.48	2.97	126						1300	126	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 241 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

RELAYS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CONTROL,GENERAL PURPOSE 200-300 VDC								948	20.920	14	20	11			
							47.941								
PHYSICAL DISPLACEMENT	2	1	.00	.00	.00	2.32	5						5	5	4
WON'T START/MOVE	3	2	.00	.00	.00	.22	18						51	18	1
WON'T CLOSE	5	3	.00	.00	.11	.32	40						168	40	1
WON'T OPEN	3	1	.00	.00	.00	.32	170						291	170	98
WON'T HOLD	1	1	.00	.00	.00	.11	312						312	312	312
TOTAL	14	4	.00	.00	.00	2.32	77						312	77	1
CONTROL,GENERAL PURPOSE OVER 300 VDC								16	.485	1	2	2			
							.517								
SPURIOUS OPERATION	1	1	.00	.00	8.78	17.56	184						184	184	184
TOTAL	1	1	.00	.00	8.78	17.56	184						184	184	184
CONTROL,GENERAL PURPOSE MULTIPLE								43	1.562	0	3	3			
							2.456								
CONTROL,GENERAL PURPOSE UNDEFINED								771	3.939	1	18	10			
							11.594								
WON'T START/MOVE	1	1	.00	.00	.00	17.56	26						26	26	26
TOTAL	1	1	.00	.00	.00	17.56	26						26	26	26

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

RELAYS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROL, SEALED LESS THAN 50 VAC	4	.224	0	2	2
CONTROL, SEALED 50-99 VAC	1	.020	0	1	1
CONTROL, SEALED 100-199 VAC	101	4.512	0	5	5
CONTROL, SEALED 200-300 VAC	4	.223	0	1	1
CONTROL, SEALED LESS THAN 50 VDC	140	4.274	0	2	2

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CONTROL, SEALED LESS THAN 50 VAC								.224			
								.224			
CONTROL, SEALED 50-99 VAC								.020			
								.031			
CONTROL, SEALED 100-199 VAC								4.512			
								5.147			
CONTROL, SEALED 200-300 VAC								.223			
								.225			
CONTROL, SEALED LESS THAN 50 VDC								4.274			
								4.282			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

RELAYS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CONTROL, SEALED 100-199 VDC	610	1.267	4	6	6
		23.119			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
COLLAPSE	1	1	.00	.00	.00	.00	1.17	6	6	6	6
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.17	11	11	11	11
WON'T OPERATE PER DEM	1	1	.00	.00	.00	.00	1.17	26	26	26	26
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	1.17	96	96	96	96
TOTAL	4	1	.00	.00	.00	.00	4.68	35	96	35	6

CONTROL, SEALED 200-300 VDC	4	.223	0	1	1
		.225			

CONTROL, SEALED UNDEFINED	2	.033	0	2	1
		.061			

MINIATURE 100-199 VAC	165	6.133	1	3	3
		6.132			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T CLOSE	1	1	.00	.00	.00	24.01	24.01	5	5	5	5
TOTAL	1	1	.00	.00	.00	24.01	24.01	5	5	5	5

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
MINIATURE																
LESS THAN 50 VDC									172							
								5.637			1	1	1			
								7.559								
ERRATIC OUTPUT	1	1	.13	.13	.13	.13	.13	5						5	5	5
TOTAL	1	1	.13	.13	.13	.13	.13	5						5	5	5
MINIATURE																
UNDEFINED									37							
								.959			0	1	1			
								1.946								
SWITCHGEAR,PROTECTIVE																
LESS THAN 50 VAC									1							
								--			0	1	1			
								.031								
SWITCHGEAR,PROTECTIVE																
100-199 VAC									303							
								11.007			3	16	13			
								14.516								
WRNT RELEASE	1	1	.00	.00	.00	.00	17.55	2						2	2	2
OUT OF LIMITS	1	1	.00	.00	.00	.00	17.55	2						2	2	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	17.56	124						124	124	124
TOTAL	3	2	.00	.00	.00	.00	35.10	43						124	43	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY / OP/CALENDAR HOURS(MILLIONS) / AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	NUMBER OF UNITS LOWEST
SWITCHGEAR,PROTECTIVE 208-300 VAC								18 / .285 / .846	0	3		3
SWITCHGEAR,PROTECTIVE OVER 300 VAC								197 / 4.112 / 7.037	1	11		3
WON'T CLOSE	1	1	.00	.00	.00	.16	.16	151	151	151		151
TOTAL	1	1	.00	.00	.00	.16	.16	151	151	151		151
SWITCHGEAR,PROTECTIVE LESS THAN 50 VDC								4 / .228 / .228	0	1		1
SWITCHGEAR,PROTECTIVE 100-199 VDC								2114 / 34.579 / 87.161	2	30		17
OUT OF LIMITS	1	1	.00	.00	.00	.00	.55	2	2	2		2
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.31	72	72	72		72
TOTAL	2	2	.00	.00	.00	.00	.55	37	72	37		2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SWITCHGEAR,PROTECTIVE 200-300 VDC								26	.911 1.481		0	2	1			
SWITCHGEAR,PROTECTIVE UNDEFINED								268	10.412 11.095		0	5	3			
SWITCHGEAR,PROTECTIVE,SLOW ACT. LESS THAN 50 VAC								1	.020 .031		0	1	1			
SWITCHGEAR,PROTECTIVE,SLOW ACT. 100-199 VAC								2	.081 .081		0	1	1			
SWITCHGEAR,PROTECTIVE,SLOW ACT. 100-199 VDC								57	-- 6.945		0	1	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS		NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	75 TH PERCENTILE	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SWITCHGEAR,AUXILIARY 100-199 VAC			234	12.160	1	9		6
				13.034				
SPURIOUS OPERATION	1	1	.00	.00	4	4	4	4
TOTAL	1	1	.00	.00	4	4	4	4
SWITCHGEAR,AUXILIARY 200-300 VAC			163	8.639	0	2		2
				8.714				
SWITCHGEAR,AUXILIARY OVER 300 VAC			12	--	0	1		1
				.447				
SWITCHGEAR,AUXILIARY 100-199 VDC			478	13.639	2	22		7
				25.846				
OUT OF ADJUSTMENT	2	2	.00	.57	2	4	2	0
TOTAL	2	2	.00	.57	2	4	2	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SWITCHGEAR,AUXILIARY OVER 300 VDC							2		--	0	1	1			
									.114						
SWITCHGEAR,AUXILIARY UNDEFINED							4		.228	0	1	1			
									.228						
MERCURY WETTED LESS THAN 50 VAC							12		.377	0	2	1			
									.666						
MERCURY WETTED 200-300 VAC							10		.204	0	2	1			
									.333						
MERCURY WETTED 200-300 VDC							3		--	0	1	1			
									.159						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
TIME DELAY,PNEUMATIC 100-199 VAC								99	2.539		1	14	11			
									4.546							
WON'T OPEN	1	1	.00	.00	.00	.00	.89			50				50	50	50
TOTAL	1	1	.00	.00	.00	.00	.89			50				50	50	50
TIME DELAY,PNEUMATIC 200-300 VAC								29	.288		0	7	4			
									1.356							
TIME DELAY,PNEUMATIC OVER 300 VAC								1	--		0	1	1			
									.057							
TIME DELAY,PNEUMATIC 100-199 VDC								154	4.999		3	22	12			
									8.650							
OUT OF LIMITS	3	1	.00	.00	.00	.00	2.63			0				0	0	0
TOTAL	3	1	.00	.00	.00	.00	2.63			0				0	0	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TIME DELAY,PNEUMATIC 200-300 VDC	48	2.575 3.025	0	6	6
TIME DELAY,PNEUMATIC MULTIPLE	120	4.682 4.942	0	2	2
TIME DELAY,PNEUMATIC UNDEFINED	39	1.531 1.622	1	5	3
TIME DELAY,SOLID STATE 50-99 VAC	13	.706 .711	1	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	17.55	17.55	4	4	4	4
TOTAL	1	1	.00	.00	17.55	17.55	4	4	4	4
FALSE RESPONSE	1	1	1.41	1.41	1.41	1.41	3	3	3	3
TOTAL	1	1	1.41	1.41	1.41	1.41	3	3	3	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			37	.294	2	4	4
				1.991			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T CLOSE	2	1	.00	.00	.00	.00	1.25	17	17	17	17
TOTAL	2	1	.00	.00	.00	.00	1.25	17	17	17	17

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			8	--	3	2	2
				.289			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T RELEASE	1	1	.00	.00	3.56	7.13	7.13	7	7	7	7
SPURIOUS OPERATION	2	1	.00	.00	7.13	14.26	14.26	7	7	7	7
TOTAL	3	1	.00	.00	10.70	21.40	21.40	7	7	7	7

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			4	.149	0	2	2
				.149			

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			105	1.704	2	11	9
				4.780			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	2	1	.00	.00	.00	.00	9.14	4	4	4	4
TOTAL	2	1	.00	.00	.00	.00	9.14	4	4	4	4

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TIME DELAY,SOLID STATE																
UNDEFINED								4		.189	0	2	1			
										.198						
REED																
100-199 VAC								3		--	0	2	1			
										.171						
REED																
LESS THAN 50 VDC								34		1.194	0	1	1			
										1.788						
REED																
100-199 VDC								39		1.246	0	3	3			
										1.246						
TELEPHONE																
100-199 VAC								6		.271	0	2	2			
										.275						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
TELEPHONE 100-199 VAC			14	.710 .021 .731	0	3	2
EVENT SEQ.,TIMER OR T-S CONTROL. 100-199 VAC			38	1.330 .102 1.432	2	6	6
	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE / MEDIAN / 75 TH PERCENTILE / ** MAXIMUM	AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST / AVERAGE / LOWEST	
PHYSICAL DISTORTION	1	1	.00 / .00 / .00 / .00 / 1.11		2	2 / 2 / 2	
OUT OF ADJUSTMENT	1	1	.00 / .00 / .00 / .00 / 24.03		1	1 / 1 / 1	
TOTAL	2	2	.00 / .00 / .00 / 1.11 / 24.03		2	2 / 2 / 1	
EVENT SEQ.,TIMER OR T-S CONTROL. 200-300 VAC			18	.025 .021 .046	0	3	3
EVENT SEQ.,TIMER OR T-S CONTROL. 100-199 VAC			205	7.816 .899 8.715	1	15	9
WON'T START/MOVE	1	1	.00 / .00 / .00 / .00 / .82		8	8 / 8 / 8	
TOTAL	1	1	.00 / .00 / .00 / .00 / .82		8	8 / 8 / 8	

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
EVENT SEQ.,TIMER OR T-S CONTROL. 200-300 VDC	17	.590	1	1	1
		.931			
OUT OF ADJUSTMENT	1	1.08	6	6	6
TOTAL	1	1.08	6	6	6
EVENT SEQ.,TIMER OR T-S CONTROL. UNDEFINED	2	--	0	1	1
		.057			
SOLID STATE(SCR'S) LESS THAN 50 VAC	4	.123	0	1	1
		.140			
SOLID STATE(SCR'S) 100-199 VAC	2	--	0	1	1
		.114			
SOLID STATE(SCR'S) LESS THAN 50 VDC	2	.078	0	2	2
		.082			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF ADJUSTMENT	1	1	1.08	1.08	1.08	1.08	1.08	6	6	6	6
TOTAL	1	1	1.08	1.08	1.08	1.08	1.08	6	6	6	6

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST AVERAGE LOWEST
SOLID STATE(SCR'S) 100-199 VDC			30			1.038 1.152	0 3 3
OTHER 100-199 VAC			22			-- 1.253	0 1 1
OTHER OVER 300 VAC			2			.073 .114	0 1 1
OTHER 100-199 VDC			13			.035 .484	0 1 1
OTHER 200-300 VDC			14			.665 .665	0 1 1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION

COMPONENTS IN CATEGORY | UP/CALENDAR HOURS(MILLIONS) | TOTAL FAILURES | NUMBER OF SYSTEMS | NUMBER OF UNITS

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER											
UNDEFINED											
21								.692	0	2	2
								1.089			
UNDEFINED											
LESS THAN 90 VAC											
2								.061	0	1	1
								.070			
UNDEFINED											
100-199 VAC											
1								.171	0	2	1
								.171			
UNDEFINED											
OVER 500 VAC											
1								.031	0	1	1
								.031			
UNDEFINED											
100-199 VDC											
4								.228	0	1	1
								.724			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED 200-300 VDC	4	.075	0	1	1
		.075			
UNDEFINED UNDEFINED	43	2.151	1	6	3
		2.266			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SPURIOUS OPERATION	1	1	.00	.00	.00	.70	.70	0	0	0	0
TOTAL	1	1	.00	.00	.00	.70	.70	0	0	0	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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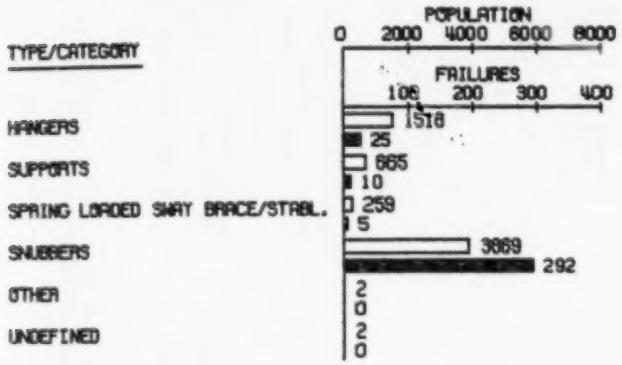
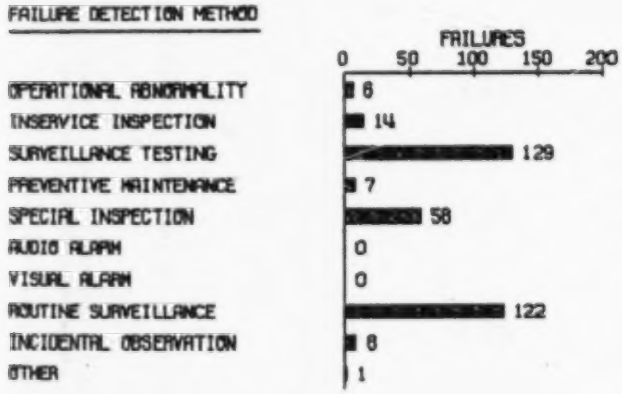
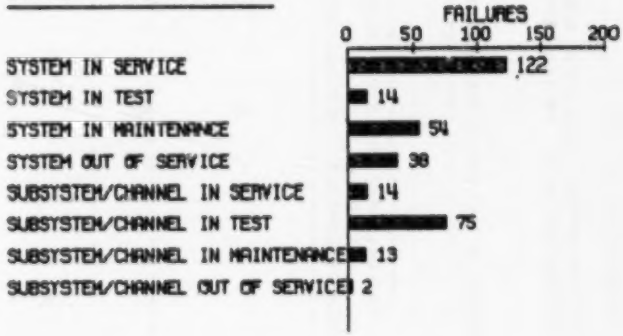
PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SHOCK SUPPRESSORS & SUPPORTS	6315	302.3256	332	7209	581	1







SUPORT

FAILURES POPULATION

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HANGERS HYDRAULIC	4	.228	0	1	1
		.228			
HANGERS CONSTANT SUPPORT SPRING HANGER	179	9.470	0	17	7
		9.711			
HANGERS VARIABLE SUPPORT SPRING HANGER	765	40.901	2	64	10
		40.807			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	12.01	83	83	83	83
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	12.01	144	144	144	144
TOTAL	2	1	.00	.00	.00	.00	24.03	114	144	114	83

HANGERS RULLING OR SLIDING	7	.399	0	3	1
		.399			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
HANGERS																
ROD TYPE HANGER								16.684	300		1		22			6
								16.816								
BREACH	1	1	.00	.00	.00	.00	17.55	2			2		2	2	2	2
TOTAL	1	1	.00	.00	.00	.00	17.55	2			2		2	2	2	2
HANGERS																
GUIDE								9.845	169		22		11			6
								9.833								
LEAK	14	2	.00	.00	.00	.60	2.61	1602			1944		1602	1602	1602	25
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	2.20	98			98		98	98	98	98
OUT OF LIMITS	7	1	.00	.00	.00	.00	15.36	340			395		340	340	340	11
TOTAL	22	3	.00	.00	.30	2.61	17.56	1132			1944		1132	1132	1132	11
HANGERS																
RESTRAINT								1.532	27		0		4			3
								1.534								
HANGERS																
MECHANICAL								.406	3		0		1			1
								.423								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
HANGERS															
OTHER								59	3.352	0	8	2			
									3.428						
SUPPORTS															
HYDRAULIC								11	.410	6	4	3			
									.435						
LEAK	5	2	.00	.00	9.78	29.77	29.77		618		2557	618	104		
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	8.78	8.78		22		22	22	22		
TOTAL	6	2	.00	.00	17.55	29.77	29.77		519		2557	519	22		
SUPPORTS															
CONSTANT SUPPORT SPRING HANGER								6	.334	0	2	1			
									.334						
SUPPORTS															
VARIABLE SUPPORT SPRING HANGER								78	4.209	1	19	5			
									4.209						
LEAK	1	1	.00	.00	.00	.00	1.03		4		4	4	4		
TOTAL	1	1	.00	.00	.00	.00	1.03		4		4	4	4		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION								COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			FAILURES PER MILLION CALENDAR HOURS									
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SUPPORTS ROLLING OR SLIDING						60		3.090 / 3.109	0	5		4
SUPPORTS ROD TYPE HANGER						1		.051 / .053	0	1		1
SUPPORTS ANCHOR						26		1.336 / 1.375	1	8		5
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	4.39	205		205	205	205
TOTAL	1	1	.00	.00	.00	.00	4.39	205		205	205	205
SUPPORTS GUIDE						242		13.572 / 13.633	0	22		6
SUPPORTS RESTRAINT						140		7.458 / 7.639	2	20		5
PHYSICAL DISPLACEMENT	2	1	.00	.00	.00	.00	17.55	50		73	50	26
TOTAL	2	1	.00	.00	.00	.00	17.55	50		73	50	26

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AQ3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SUPPORTS											
RIGID STRUT TENSION/COMPRESSION						51		2.749	0	6	2
								2.803			
SUPPORTS											
MECHANICAL						19		.278	0	2	2
								.278			
SUPPORTS											
OTHER						30		1.522	0	7	1
								1.586			
SUPPORTS											
UNDEFINED						1		.057	0	1	1
								.057			
SPRING LOADED SWAY BRACE/STABL.											
HYDRAULIC						5		.284	0	2	1
								.284			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SPRING LOADED SWAY BRACE/STABL. CONSTANT SUPPORT SPRING HANGER	16	.903 .912	5	3	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	2	1	.00	.00	.00	8.78	8.78	12	17	12	7
PHYSICAL DISPLACEMENT	2	1	.00	.00	.00	8.78	8.78	22	22	22	22
FRACTURE/BREAK	1	1	.00	.00	.00	4.39	4.39	46	46	46	46
TOTAL	5	1	.00	.00	.00	21.94	21.94	23	46	23	7

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SPRING LOADED SWAY BRACE/STABL. VARIABLE SUPPORT SPRING HANGER	201	11.452 11.452	0	13	4

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SPRING LOADED SWAY BRACE/STABL. ROLLING OR SLIDING	1	.057 .057	0	1	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SPRING LOADED SWAY BRACE/STABL. ROD TYPE HANGER	1	.057 .057	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY / UP/CALENDAR HOURS(MILLIONS) / AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
										OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SPRING LOADED SWAY BRACE/STABL. RESTRAINT								8			
								.456	0	1	1
								.456			
SPRING LOADED SWAY BRACE/STABL. RIGID STRUT TENSION/COMPRESSION								27			
								1.538	0	2	2
								1.538			
SNUBBERS HYDRAULIC								3504			
								111.399	282	242	35
								151.179			
LEAK	128	20	.00	.00	.21	1.54	22.23	597	2066	597	1
CRACK	3	3	.00	.00	.00	.00	1.11	8	9	8	8
PHYSICAL DISTORTION	3	3	.00	.00	.00	.00	.34	23	28	23	15
PHYSICAL DISPLACEMENT	9	7	.00	.00	.00	.00	2.22	42	192	42	1
FRACTURE/BREAK	6	3	.00	.00	.00	.00	1.11	24	96	28	2
WON'T START/MOVE	1	1	.00	.00	.00	.00	.15	143	143	143	143
WON'T HOLD	17	4	.00	.00	.00	.00	10.00	1309	7209	1309	48
OUT OF LIMITS	35	3	.00	.00	.00	.00	9.61	305	984	305	8
OUT OF ADJUSTMENT	76	5	.00	.00	.00	.00	17.70	483	599	483	8
OTHER (SEE REMARKS)	4	2	.00	.00	.00	.00	2.22	62	104	62	32
TOTAL	282	25	.00	.00	.60	3.19	40.01	522	7209	522	1
SNUBBERS CONSTANT SUPPORT SPRING HANGER								25			
								1.424	0	4	2
								1.424			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SNUBBERS ROLLING OR SLIDING	1	.051 .002 .053	0	1	1
SNUBBERS GUIDE	178	8.544 .307 8.851	9	10	2
SNUBBERS RESTRAINT	129	5.669 0 5.669	0	7	1
SNUBBERS RIGID STRUT TENSION/COMPRESSION	8	.123 0 .123	0	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	7	2	.40	.40	1.69	2.98	2.98	1378	4684	1378	111
PHYSICAL DISTORTION	2	1	.00	.00	.74	1.49	1.49	62	77	62	47
TOTAL	9	2	.40	.40	2.44	4.48	4.48	1086	4684	1086	47

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

SHOCK SUPPRESSORS & SUPPORTS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SNUBBERS																
OTHER									24							
								1.051			1	10	2			
								1.367								
PHYSICAL DISPLACEMENT	1	1	.00	.00	.62	1.25	1.25	622								
TOTAL	1	1	.00	.00	.62	1.25	1.25	622						622	622	622
								622						622	622	622
OTHER																
CONSTANT SUPPORT SPRING HANGER									1							
								.051			0	1	1			
								.053								
OTHER																
RIGID STRUT TENSION/COMPRESSION									1							
								.051			0	1	1			
								.053								
UNDEFINED																
GUIDE									1							
								.051			0	1	1			
								.053								
UNDEFINED																
UNDEFINED									1							
								.057			0	1	1			
								.057								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

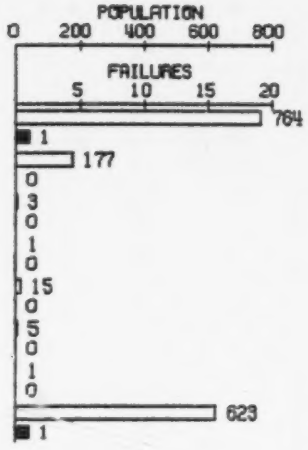
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

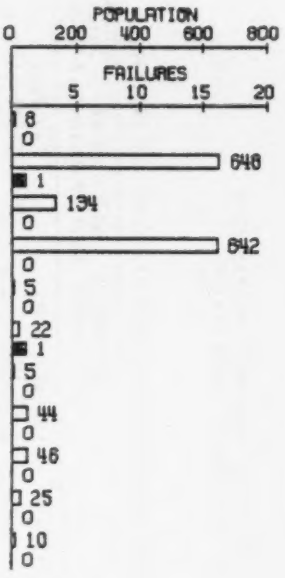
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TRANSFORMERS	1589	66.2729	2	2568	1499	430

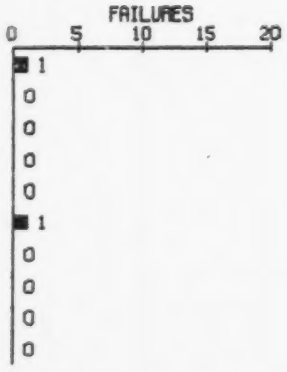
TYPE/CATEGORY



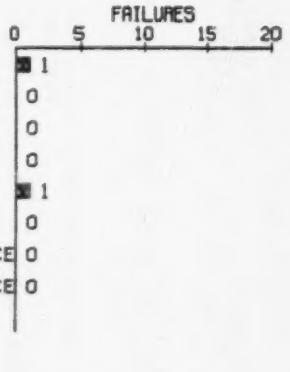
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



TRANSF

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 1/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

TRANSFORMERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			MINIMUM					AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
0-299 VAC AIR COOLED,NATURAL CIRCULATION							757	24.476	1	46		22
								30.920				
SPURIOUS OPERATION	1	1	.00	.00	.00	1.52		2568		2568	2568	2568
TOTAL	1	1	.00	.00	.00	1.52		2568		2568	2568	2568
0-299 VAC OIL COOLED,FORCED CIRCULATION							1	.029	0	1		1
								.029				
0-299 VAC OTHER							3	.139	0	1		1
								.171				
0-299 VAC UNDEFINED							3	.081	0	1		1
								.158				
300-699 VAC AIR COOLED,NATURAL CIRCULATION							57	2.914	0	22		21
								3.285				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

TRANSFORMERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
300-699 VAC AIR COOLED,FORCED CIRCULATION	28	1.346	0	5	5
		1.372			
300-699 VAC OIL COOLED,NATURAL CIRCULATION	16	.797	0	5	5
		.826			
300-699 VAC FORCED OIL/FORCED AIR (FO/FA)	15	.844	0	6	6
		.846			
300-699 VAC OTHER	51	1.882	0	5	5
		2.097			
700-1,999 VAC AIR COOLED,NATURAL CIRCULATION	2	.057	0	1	1
		.061			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION * 25 TH PERCENTILE MINIMUM	MEDIAN	CALENDAR HOURS 75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
300-699 VAC AIR COOLED,FORCED CIRCULATION										
300-699 VAC OIL COOLED,NATURAL CIRCULATION										
300-699 VAC FORCED OIL/FORCED AIR (FO/FA)										
300-699 VAC OTHER										
700-1,999 VAC AIR COOLED,NATURAL CIRCULATION										

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

TRANSFORMERS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	**	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
700-1,999 VAC																	
UNDEFINED									1		.013	0	1	1			
											.031						
2,000-2,999 VAC																	
AIR COOLED,FORCED CIRCULATION									1		.013	0	1	1			
											.031						
3,000-5,999 VAC																	
OIL COOLED,NATURAL CIRCULATION									1		--	0	1	1			
											.057						
3,000-5,999 VAC																	
FORCED OIL/FORCED AIR (FO/FA)									10		.389	0	5	5			
											.586						
3,000-5,999 VAC																	
OTHER									4		.171	0	2	2			
											.237						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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TRANSFORMERS

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
6,000-8,999 VAC																
FORCED OIL/FORCED AIR (FO/FA)								3		.088	0	1	1			
										.132						
6,000-8,999 VAC																
OTHER								2		.055	0	1	1			
										.111						
OVER 36,000 VAC																
FORCED OIL/FORCED AIR (FO/FA)								1		.031	0	1	1			
										.044						
UNDEFINED																
AIR COOLED,NATURAL CIRCULATION								603		9.617	0	10	7			
										24.382						
UNDEFINED																
AIR COOLED,FORCED CIRCULATION								2		.110	1	1	1			
										.110						
SHORT TO GROUND	1	1	9.13	9.13	9.13	9.13	9.13			430		430	430	430	430	430
TOTAL	1	1	9.13	9.13	9.13	9.13	9.13			430		430	430	430	430	430

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
UNDEFINED OIL COOLED;NATURAL CIRCULATION									7							
								.189			0	2	2			
								.290								
UNDEFINED FORCED OIL/FORCED AIR (FO/FA)									5							
								.105			0	2	2			
								.268								
UNDEFINED UNDEFINED									6							
								.156			0	3	2			
								.230								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

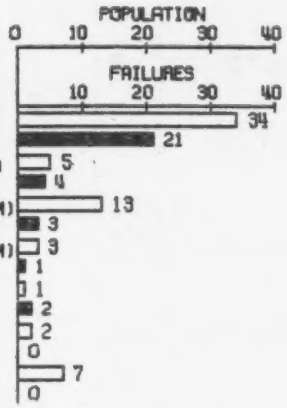
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

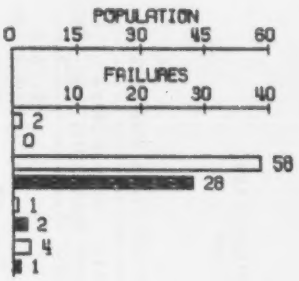
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
TURBINES	65	3.2033	31	2064	139	0

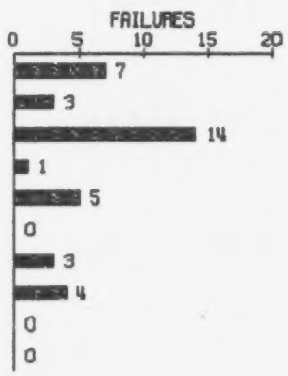
TYPE/CATEGORY



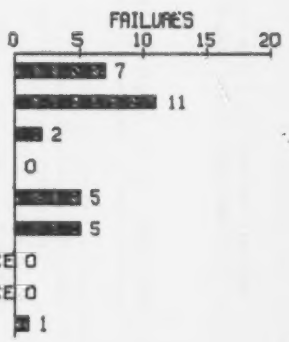
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



TURBIN

FAILURES POPULATION

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

TURBINES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SINGLE STAGE, NONCOND. (STEAM) LESS THAN 500 HP			10	.119 / .592	2	9	9
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OUT OF LIMITS	1	1	.00	.00	.00	17.55	37	37	37	37
SPURIOUS OPERATION	1	1	.00	.00	.00	17.55	50	50	50	50
TOTAL	2	1	.00	.00	.00	35.10	44	50	44	37
SINGLE STAGE, NONCOND. (STEAM) 500-999 HP			19	.034 / .851	10	18	18
LEAK	1	1	.00	.00	.00	18.57	2064	2064	2064	2064
PHYSICAL DISPLACEMENT	2	2	.00	.00	.00	22.76	28	32	28	23
FRACTURE/BREAK	1	1	.00	.00	.00	18.57	624	624	624	624
WON'T START/MOVE	1	1	.00	.00	.00	22.76	0	0	0	0
WON'T HOLD	1	1	.00	.00	.00	22.76	319	319	319	319
OUT OF ADJUSTMENT	1	1	.00	.00	.00	17.78	3	3	3	3
SPURIOUS OPERATION	1	1	.00	.00	.00	24.03	3	3	3	3
WON'T CONTROL	2	1	.00	.00	.00	297.89	1	1	1	0
TOTAL	10	6	.00	.00	18.91	297.89	307	2064	307	0
SINGLE STAGE, NONCOND. (STEAM) 1000-5000 HP			5	.001 / .229	9	5	5
FRACTURE/BREAK	1	1	.00	.00	.00	17.56	3	3	3	3
WON'T START/MOVE	2	1	.00	.00	.00	49.52	4	4	4	4
OUT OF ADJUSTMENT	6	2	.00	.00	24.76	120.05	87	245	87	3
TOTAL	9	3	.00	.00	17.56	74.28	120.05	59	245	59

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

TURBINES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
SINGLE STAGE,CONDENSING (STEAM) LESS THAN 500 HP	2	--	0	2	2
		.085			
SINGLE STAGE,CONDENSING (STEAM) 500-999 HP	2	.001	4	1	1
		.055			
SINGLE STAGE,CONDENSING (STEAM) 1000-5000 HP	1	--	0	1	1
		.029			
MULTISTAGE,NONCONDENSING (STEAM) LESS THAN 500 HP	2	.001	2	2	2
		.074			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	2	1	36.67	36.67	36.67	36.67	5	9	5	1
SPURIOUS OPERATION	2	1	36.67	36.67	36.67	36.67	6	7	6	5
TOTAL	4	1	73.33	73.33	73.33	73.33	5	9	6	1
WON'T HOLD	1	1	.00	.00	15.21	30.43	322	322	322	322
OUT OF LIMITS	1	1	.00	.00	12.01	24.03	55	55	55	55
TOTAL	2	2	24.03	24.03	27.23	30.43	189	322	189	55

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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TURBINES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
MULTISTAGE,NONCONDENSING (STEAM) 1000-5000 HP								10	.001	.520	1	10	10			
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	30.43			32				32	32	32
TOTAL	1	1	.00	.00	.00	.00	30.43			32				32	32	32
MULTISTAGE,NONCONDENSING (STEAM) UNDEFINED								1	.033	.033	0	1	1			
M.STAGE SINGLE FLOW,COND.(STEAM) 500-999 HP								3	--	.174	1	3	3			
OUT OF ADJUSTMENT	1	1	.00	.00	.00	18.88	18.88			50				50	50	50
TOTAL	1	1	.00	.00	.00	18.88	18.88			50				50	50	50
COMBUSTION OVER 5000 HP								1	.001	.055	2	1	1			
PHYSICAL DISTORTION	1	1	18.26	18.26	18.26	18.26	18.26			104				104	104	104
FRACTURE/BREAK	1	1	18.26	18.26	18.26	18.26	18.26			28				28	28	28
TOTAL	2	1	36.52	36.52	36.52	36.52	36.52			66				104	66	28

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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TURBINES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HYDRO OVER 5000 HP	2	.026 .131	0	1	1
UNDEFINED 1000-5000 HP	1	-- .031	0	1	1
UNDEFINED OVER 5000 HP	6	.249 .347	0	3	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
HYDRO OVER 5000 HP											
UNDEFINED 1000-5000 HP											
UNDEFINED OVER 5000 HP											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

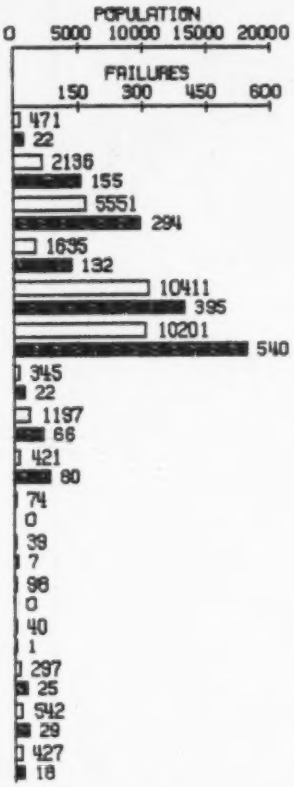
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

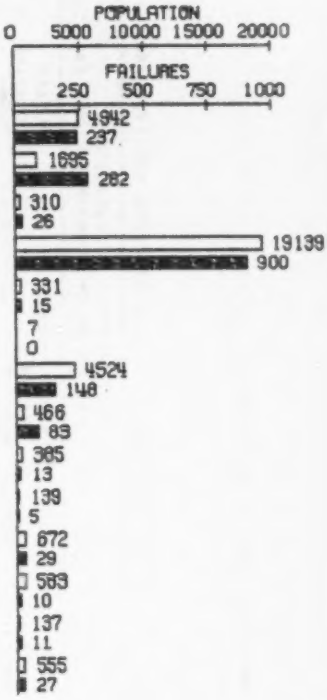
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
VALVES	33865	1620.9182	1786	8285	111	0

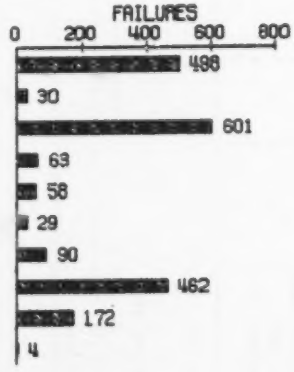
TYPE/CATEGORY



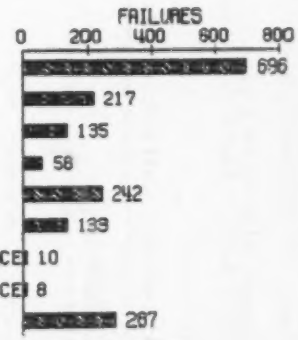
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



FAILURES

POPULATION

VALVEX

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
BALL MANUAL 1/2 TO 1.99 IN.	100	1.659 5.941	0	11	6
BALL MANUAL 2 TO 3.99 IN.	159	4.227 9.104	12	23	13
BALL MANUAL 4 TO 11.99 IN.	52	1.178 2.537	0	10	6
BALL MANUAL 12 TO 19.99 IN	10	.055 .540	0	4	4

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	1	.00	.00	.00	.00	.36	5545	5545	5545	5545
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.18	102	102	102	102
WON'T START/MOVE	2	1	.00	.00	.00	.00	.36	21	21	21	21
WON'T CLOSE	6	1	.00	.00	.00	.00	1.07	3450	8285	3450	6
WON'T HOLD	1	1	.00	.00	.00	.00	2.25	1058	1058	1058	1058
TOTAL	12	2	.00	.00	.00	.00	2.25	2749	8285	2749	6

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
BALL MANUAL 40 TO 59.99 IN								-- .114	2		1	1	1			
LEAK	1	1	8.78	8.78	8.78	8.78	8.78	415						415	415	415
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78	415						415	415	415
BALL ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.								-- .271	9		0	2	2			
BALL ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.								.659 .891	18		2	4	4			
LEAK	1	1	.00	.00	.00	.00	4.39	264						264	264	264
OUT OF LIMITS	1	1	.00	.00	.00	.00	4.39	264						264	264	264
TOTAL	2	1	.00	.00	.00	.00	8.78	264						264	264	264
BALL ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.								.338 .746	22		3	10	10			
LEAK	2	1	.00	.00	.00	.00	17.55	2956						5906	2956	5
OUT OF LIMITS	1	1	.00	.00	.00	.00	8.78	149						149	149	149
TOTAL	3	1	.00	.00	.00	.00	26.33	2020						5906	2020	5

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

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VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BALL ELECTRIC MOTOR/SERVO 40 TO 59.99 IN								2	-- / .054	--	0	1	1			
BALL ELECTRIC MOTOR/SERVO UNDEFINED								1	-- / .031	--	0	1	1			
BALL HYDRAULIC 2 TO 3.99 IN.								5	.027 / .084	.027	0	2	2			
BALL HYDRAULIC 4 TO 11.99 IN.								5	-- / .154	--	0	1	1			
BALL HYDRAULIC UNDEFINED								2	.067 / .067	.067	0	1	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
BALL PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.								10	.452 .070 .522		0	2	2			
BALL PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.								7	.258 .080 .338		0	5	4			
BALL PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.								24	.801 .343 1.144		2	9	8			
LEAK	2	1	.00	.00	.00	.00	26.85			462		818	462	105		
TOTAL	2	1	.00	.00	.00	.00	26.85			462		818	462	105		
BALL PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN								2	-- .106		0	1	1			
BALL SOLENOID 1/2 TO 1.99 IN.								1	.042 .000 .042		1	1	1			
WON'T CLOSE	1	1	24.01	24.01	24.01	24.01	24.01			11		11	11	11		
TOTAL	1	1	24.01	24.01	24.01	24.01	24.01			11		11	11	11		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BALL MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.									15							
								.228			1	4	2			
								.941								
LEAK	1	1	.00	.00	11.37	22.74	22.74	176						176	176	176
TOTAL	1	1	.00	.00	11.37	22.74	22.74	176						176	176	176
BALL MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.									4							
								.171			0	3	1			
								.228								
BALL MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.									9							
								.166			0	4	4			
								.410								
BALL MECH.(DIFF.PRES.TO O/S FORCE CL) 12 TO 19.99 IN									4							
								.133			0	1	1			
								.133								
BALL MECH.(DIFF.PRES.TO O/S FORCE CL) UNDEFINED									1							
								.044			0	1	1			
								.057								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
BALL NONE 2 TO 3.99 IN.								3		.034 .132	0	1	1			
BALL OTHER 4 TO 11.99 IN.								2		-- .106	0	1	1			
BALL UNDEFINED 2 TO 3.99 IN.								2		-- .074	0	1	1			
BUTTERFLY MANUAL 2 TO 3.99 IN.								17		.222 .787	0	5	5			
BUTTERFLY MANUAL 4 TO 11.99 IN.								345		9.620 13.560	2	51	28			
LEAK	2	1	.00	.00	.00	.00	5.27			1272		1272	1272	1272	1272	1272
TOTAL	2	1	.00	.00	.00	.00	5.27			1272		1272	1272	1272	1272	1272

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
BUTTERFLY MANUAL 12 TO 19.99 IN	306	6.521	7	49	31
		13.799			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	4	1	.00	.00	.00	.00	1.79	913	1083	913	488
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.45	408	408	408	408
WON'T HOLD	1	1	.00	.00	.00	.00	1.63	608	608	608	608
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.11	193	193	193	193
TOTAL	7	3	.00	.00	.00	.00	2.24	695	1083	695	193

BUTTERFLY MANUAL 20 TO 39.99 IN						57		1.008	2	12	12
								1.938			
LEAK	1	1	.00	.00	.00	.00	12.01	4533	4533	4533	4533
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	15.21	596	596	596	596
TOTAL	2	2	.00	.00	.00	.00	15.21	2565	4533	2565	596
BUTTERFLY MANUAL 40 TO 59.99 IN						2		--	0	1	1
								.054			
BUTTERFLY MANUAL UNDEFINED						3		.014	0	2	2
								.094			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
BUTTERFLY ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.									2							
								.057			0	1	1			
								.057								
BUTTERFLY ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.									94							
								1.840			5	25	16			
								3.243								
LEAK	4	2	.00	.00	.00	.00	7.86	27						44	27	3
WON'T CLOSE	1	1	.00	.00	.00	.00	5.07	48						48	48	48
TOTAL	5	2	.00	.00	.00	.00	10.15	31						48	31	3
BUTTERFLY ELECTRIC MOTOR/SERVO 12 TO 19.99 IN									157							
								2.971			3	31	24			
								5.876								
WON'T START/MOVE	2	1	.00	.00	.00	.00	18.33	119						119	119	119
WON'T OPEN	1	1	.00	.00	.00	.00	3.09	7						7	7	7
TOTAL	3	2	.00	.00	.00	.00	18.33	82						119	82	7
BUTTERFLY ELECTRIC MOTOR/SERVO 20 TO 39.99 IN									85							
								1.004			7	19	16			
								2.960								
LEAK	5	3	.00	.00	.00	.00	18.91	167						445	167	18
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	10.00	188						188	188	188
TOTAL	7	4	.00	.00	.00	.00	18.91	173						445	173	18

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
BUTTERFLY ELECTRIC MOTOR/SERVO 40 TO 59.99 IN			23	.594 .782	2	6	5
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	1	.00	.00	.00	.00	24.76	8	8	8	8
TOTAL	2	1	.00	.00	.00	.00	24.76	8	8	8	8
BUTTERFLY ELECTRIC MOTOR/SERVO OVER 60 IN			15	.126 .610	0	4	3
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.			23	.878 1.079	2	12	7
LEAK	2	1	.00	.00	.00	.00	7.02	696	696	696	696
TOTAL	2	1	.00	.00	.00	.00	7.02	696	696	696	696
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.			287	8.658 12.961	14	75	44
LEAK	7	7	.00	.00	.00	.00	12.01	1291	4251	1291	6
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	2.93	2	2	2	2
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.63	39	39	39	39
WON'T CLOSE	1	1	.00	.00	.00	.00	8.78	98	98	98	98
WON'T OPEN	2	2	.00	.00	.00	.00	12.22	25	48	25	2
OUT OF LIMITS	1	1	.00	.00	.00	.00	5.85	17	17	17	17
FLOW LEAK	1	1	.00	.00	.00	.00	.99	50	50	50	50
TOTAL	14	10	.00	.00	.00	.00	17.56	664	4251	664	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN			321	9.747 15.131	43	64	44
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
			MINIMUM							
LEAK	24	8	.00	.00	.00	15.01	897	4251	897	30
CRACK	3	1	.00	.00	.00	4.39	31	46	31	17
BREACH	1	1	.00	.00	.00	1.60	24	24	24	24
PHYSICAL DISTORTION	2	1	.00	.00	.00	1.69	412	766	412	57
FRACTURE/BREAK	1	1	.00	.00	.00	.84	20	20	20	20
WON'T START/MOVE	2	1	.00	.00	.00	14.67	20	36	20	4
WON'T CLOSE	1	1	.00	.00	.00	1.60	16	16	16	16
WON'T OPEN	2	2	.00	.00	.00	7.33	1	1	1	1
OUT OF ADJUSTMENT	3	2	.00	.00	.00	7.33	1452	2185	1452	40
SPURIOUS OPERATION	2	1	.00	.00	.00	14.67	166	280	166	52
FLOW LEAK	1	1	.00	.00	.00	2.20	8	8	8	8
OTHER (SEE REMARKS)	1	1	.00	.00	.00	3.57	168	168	168	168
TOTAL	43	12	.00	.00	.00	44.00	637	4251	637	1
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN			233	7.253 10.615	51	50	36			
LEAK	32	11	.00	.00	.00	39.50	442	5112	442	0
BREACH	1	1	.00	.00	.00	3.57	222	222	222	222
WON'T START/MOVE	2	1	.00	.00	.00	6.31	73	73	73	73
WON'T CLOSE	4	3	.00	.00	.00	9.13	907	3555	907	0
WON'T OPEN	1	1	.00	.00	.00	4.72	1	1	1	1
OUT OF LIMITS	3	2	.00	.00	.00	6.82	80	120	80	0
OUT OF ADJUSTMENT	6	2	.00	.00	.00	18.25	28	80	28	4
FALSE RESPONSE	1	1	.00	.00	.00	15.01	26	26	26	26
OTHER (SEE REMARKS)	1	1	.00	.00	.00	1.11	2472	2472	2472	2472
TOTAL	51	14	.00	.00	.00	41.07	413	5112	413	0

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY / AVERAGE RESTORATION HOURS	OP/CALENDAR HOURS(MILLIONS) / OUT-OF-SERVICE HOURS HIGHEST	TOTAL FAILURES / OUT-OF-SERVICE HOURS AVERAGE	NUMBER OF SYSTEMS / OUT-OF-SERVICE HOURS LOWEST	NUMBER OF UNITS
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER 40 TO 59.99 IN								46	1.354	14	12	11
									1.750			
LEAK	14	2	.00	.00	.00	.00	98.65		10	40	10	2
TOTAL	14	2	.00	.00	.00	.00	98.65		10	40	10	2
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER OVER 60 IN								32	.198	0	7	6
									1.571			
BUTTERFLY PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED								3	.027	1	2	2
									.115			
OUT OF ADJUSTMENT	1	1	.00	.00	18.33	36.67	36.67		10	10	10	10
TOTAL	1	1	.00	.00	18.33	36.67	36.67		10	10	10	10
BUTTERFLY SOLENOID 1/2 TO 1.99 IN.								4	.176	0	1	1
									.176			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
BUTTERFLY SOLENOID 4 TO 11.99 IN.	2	.001 / .099	0	1	1
BUTTERFLY SOLENOID 12 TO 19.99 IN	2	-- / .114	0	1	1
BUTTERFLY SOLENOID 20 TO 39.99 IN	1	.057 / .057	0	1	1
BUTTERFLY SOLENOID UNDEFINED	1	.035 / .053	0	1	1
BUTTERFLY MECH.(DIFF.PRES.TO U/S FORCE CL) 12 TO 19.99 IN	4	.102 / .149	0	2	2

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BUTTERFLY SOLENOID 4 TO 11.99 IN.										
BUTTERFLY SOLENOID 12 TO 19.99 IN										
BUTTERFLY SOLENOID 20 TO 39.99 IN										
BUTTERFLY SOLENOID UNDEFINED										
BUTTERFLY MECH.(DIFF.PRES.TO U/S FORCE CL) 12 TO 19.99 IN										

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BUTTERFLY MECH.(DIFF.PRES.TO O/S FORCE CL) 20 TO 39.99 IN								5		.058 .285	2	1	1			
LEAK	2	1	7.02	7.02	7.02	7.02	7.02			3				4	3	2
TOTAL	2	1	7.02	7.02	7.02	7.02	7.02			3				4	3	2
BUTTERFLY MECH.(DIFF.PRES.TO O/S FORCE CL) UNDEFINED								4		.149 .149	0	1	1			
BUTTERFLY NONE 2 TO 3.99 IN.								1		.020 .033	0	1	1			
BUTTERFLY NONE 4 TO 11.99 IN.								3		-- .141	0	3	3			
BUTTERFLY NONE 20 TO 39.99 IN								5		.001 .135	0	1	1			

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
BUTTERFLY OTHER 4 TO 11.99 IN.								2	.036 .106		0	1	1			
BUTTERFLY OTHER 12 TO 19.99 IN								2	.036 .106		0	1	1			
BUTTERFLY UNDEFINED 2 TO 3.99 IN.								33	1.099 1.099		0	1	1			
BUTTERFLY UNDEFINED 4 TO 11.99 IN.								16	.624 .659		0	2	2			
CHECK MANUAL 1/2 TO 1.99 IN.								381	5.655 20.783		0	27	8			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	CP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK MANUAL 2 TO 3.99 IN.			404	12.945 / 16.918	7	82	35
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	6	3	.00	.00	.00	3.51	2303	6628	2303	11
HUNGT STOP	1	1	.00	.00	.00	3.00	3	3	3	3
TOTAL	7	4	.00	.00	.00	3.51	1975	6628	1975	3
CHECK MANUAL 4 TO 11.99 IN.			330	10.582 / 14.357	9	78	24
LEAK	9	3	.00	.00	.00	5.00	2456	6024	2456	96
TOTAL	9	3	.00	.00	.00	5.00	2456	6024	2456	96
CHECK MANUAL 12 TO 19.99 IN			111	2.995 / 4.638	1	36	19
LEAK	1	1	.00	.00	.00	2.51	152	152	152	152
TOTAL	1	1	.00	.00	.00	2.51	152	152	152	152
CHECK MANUAL 20 TO 39.99 IN			27	.886 / 1.192	0	10	10

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK MANUAL UNDEFINED			6	.172	1	5	5
				.284			
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	20.01	1037	1037	1037	1037
TOTAL	1	1	.00	.00	.00	.00	20.01	1037	1037	1037	1037
CHECK ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.			5	.059	1	3	2
				.264			
LEAK	1	1	.00	.00	4.39	8.78	8.78	6387	6387	6387	6387
TOTAL	1	1	.00	.00	4.39	8.78	8.78	6387	6387	6387	6387
CHECK ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.			5	.021	0	3	3
				.145			
CHECK ELECTRIC MOTOR/SERVO 12 TO 19.99 IN			14	.181	5	6	5
				.526			
LEAK	3	2	.00	.00	.00	10.74	15.21	168	352	168	29
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	10.74	122	123	122	121
TOTAL	5	2	.00	.00	.00	15.21	21.47	150	352	150	29

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CHECK ELECTRIC MOTOR/SERVO 20 TO 39.99 IN							7	.287 .419		0	2	2			
CHECK HYDRAULIC 1/2 TO 1.99 IN.							2	.110 .114		0	1	1			
CHECK HYDRAULIC 2 TO 3.99 IN.							15	.092 1.026		0	7	2			
CHECK HYDRAULIC 4 TO 11.99 IN.							49	.828 2.437		0	9	2			
CHECK HYDRAULIC 12 TO 19.99 IN							8	.219 .456		0	3	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	75 TH PERCENTILE ** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CHECK HYDRAULIC 20 TO 39.99 IN			2	.064	0	1	1
				.088			
CHECK PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.			10	.186	0	5	5
				.431			
CHECK PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.			20	.717	0	6	6
				.821			
CHECK PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.			30	1.013	5	15	14
				1.458			
LEAK	3	3	.00 .00 .00 .00 17.57	540	1415	540	32
OUT OF ADJUSTMENT	2	1	.00 .00 .00 .00 7.02	8	8	8	8
TOTAL	5	3	.00 .00 .00 .00 17.57	327	1415	327	8

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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CHECK PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN			116	3.422 5.867	17	32	18
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM / MEDIAN / 75 TH PERCENTILE / MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	7	5	.00 / .00 / .00 / .95 / 35.12		640	3526	640	22
PHYSICAL DISTURTION	1	1	.00 / .00 / .00 / .00 / 8.78		7	7	7	7
WON'T START/MOVE	1	1	.00 / .00 / .00 / .00 / 1.72		2329	2329	2329	2329
WON'T CLOSE	3	2	.00 / .00 / .00 / .00 / 1.90		30	35	30	24
WON'T OPEN	1	1	.00 / .00 / .00 / .00 / 8.78		2193	2193	2193	2193
FALSE RESPONSE	4	1	.00 / .00 / .00 / .00 / 6.86		372	528	372	10
TOTAL	17	6	.00 / .00 / .00 / 2.85 / 35.12		623	3526	623	7
CHECK PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN			65	1.845 2.913	20	21	21
LEAK	10	3	.00 / .00 / .00 / .00 / 52.67		1102	4269	1102	24
PHYSICAL DISTURTION	4	3	.00 / .00 / .00 / .00 / 18.33		6	10	6	0
WON'T START/MOVE	1	1	.00 / .00 / .00 / .00 / 4.39		4	4	4	4
WON'T HOLD	1	1	.00 / .00 / .00 / .00 / 6.58		43	43	43	43
SPURIOUS OPERATION	4	1	.00 / .00 / .00 / .00 / 35.10		47	84	47	10
TOTAL	20	7	.00 / .00 / .00 / 6.58 / 61.45		564	4269	564	0
CHECK PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED			4	-- .219	1	1	1
LEAK	1	1	4.56 / 4.56 / 4.56 / 4.56 / 4.56		6	6	6	6
TOTAL	1	1	4.56 / 4.56 / 4.56 / 4.56 / 4.56		6	6	6	6

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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CHECK SOLENOID 2 TO 3.99 IN.	6	-- / .162	0	1	1
CHECK SOLENOID 20 TO 39.99 IN	3	.049 / .112	4	1	1
CHECK EXPLOSIVE,SQUIB 2 TO 3.99 IN.	1	-- / .053	0	1	1
CHECK MECH.(DIFF.PRES.TO O/S FORCE CL) UNDER 1/2 IN.	1	-- / .057	0	1	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CRACK	1	1	8.95	8.95	8.95	8.95	8.95	538	538	538	538
SPURIOUS OPERATION	3	1	26.85	26.85	26.85	26.85	26.85	1324	1324	1324	1324
TOTAL	4	1	35.80	35.80	35.80	35.80	35.80	1128	1324	1128	538

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.			108	3.136	2	31	17
				4.995			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	.00	17.56	94	120	94	68
TOTAL	2	2	.00	.00	.00	.00	17.56	94	120	94	68

CHECK MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.	301	7.939	5	68	27
		12.662			

LEAK	5	4	.00	.00	.00	.00	15.22	49	115	49	0
TOTAL	5	4	.00	.00	.00	.00	15.22	49	115	49	0

CHECK MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.	203	3.655	2	41	22
		7.398			

LEAK	1	1	.00	.00	.00	.00	1.41	1279	1279	1279	1279
FRACTURE/BREAK	1	1	.00	.00	.00	.00	1.48	39	39	39	39
TOTAL	2	2	.00	.00	.00	.00	1.48	659	1279	659	39

CHECK MECH.(DIFF.PRES.TO O/S FORCE CL) 12 TO 19.99 IN.	79	2.030	14	20	15
		3.370			

LEAK	5	1	.00	.00	.00	.00	10.29	529	1152	529	5
WON'T CLOSE	5	1	.00	.00	.00	.00	6.27	1049	1279	1049	606
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.83	10	10	10	10
OTHER (SEE REMARKS)	3	1	.00	.00	.00	.00	5.48	2	2	2	2
TOTAL	14	4	.00	.00	.00	3.43	10.29	565	1279	565	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK MECH.(DIFF.PRES.TO O/S FORCE CL) 20 TO 39.99 IN	15	.485 / .529	4	6	5

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T CLOSE	2	1	.00	.00	.00	.00	17.55	302	594	302	10
WON'T HOLD	1	1	.00	.00	.00	.00	8.78	2136	2136	2136	2136
OUT OF LIMITS	1	1	.00	.00	.00	.00	8.78	1	1	1	1
TOTAL	4	2	.00	.00	.00	8.78	26.33	685	2136	685	1

CHECK NONE UNDER 1/2 IN.	2	.110 / .114	0	1	1

CHECK NONE 1/2 TO 1.99 IN.	327	10.087 / 15.553	23	71	37

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	19	7	.00	.00	.00	.00	20.20	583	2062	583	2
CRACK	1	1	.00	.00	.00	.00	.86	165	165	165	165
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.90	5	5	5	5
WON'T HOLD	1	1	.00	.00	.00	.00	.51	24	24	24	24
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	8.78	799	1581	799	16
TOTAL	23	9	.00	.00	.00	.00	20.20	534	2062	534	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS		NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS				OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CHECK									1050	28.440	39	185		47
NONE										------				
2 TO 3.99 IN.										50.046				
LEAK	36	12	.00	.00	.00	.94	4.94	1035				7246	1035	0
WON'T CLOSE	1	1	.00	.00	.00	.00	1.65	144				144	144	144
WON'T OPEN	2	1	.00	.00	.00	.00	1.67	763				763	763	763
TOTAL	39	12	.00	.00	.00	1.25	6.58	999				7246	999	0
CHECK									927	23.075	32	203		48
NONE										------				
4 TO 11.99 IN.										43.603				
LEAK	29	11	.00	.00	.00	.00	15.22	1047				4236	1166	0
WON'T CLOSE	1	1	.00	.00	.00	.00	5.07	1032				1032	1032	1032
WON'T OPEN	1	1	.00	.00	.00	.00	.53	196				196	196	196
WON'T HOLD	1	1	.00	.00	.00	.00	1.13	205				205	205	205
TOTAL	32	12	.00	.00	.00	.00	20.29	993				4236	1101	0
CHECK									456	14.255	30	106		39
NONE										------				
12 TO 19.99 IN										21.727				
LEAK	23	9	.00	.00	.00	.00	15.22	1002				4200	1003	6
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	.40	12				12	12	12
WON'T CLOSE	2	2	.00	.00	.00	.00	1.17	122				242	122	2
WON'T OPEN	1	1	.00	.00	.00	.00	1.06	1147				1147	1147	1147
OUT OF ADJUSTMENT	3	1	.00	.00	.00	.00	3.10	3				3	3	3
TOTAL	30	12	.00	.00	.00	1.09	15.22	815				4200	816	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK NONE 20 TO 39.99 IN	72	1.606 3.033	0	24	18
CHECK NONE 40 TO 59.99 IN	3	.140 .138	1	2	2
CHECK NONE OVER 60 IN	2	.110 .114	0	1	1
CHECK NONE UNDEFINED	30	1.037 1.575	1	10	7

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	4.39	8.78	8.78	26	26	26	26
TOTAL	1	1	.00	.00	4.39	8.78	8.78	26	26	26	26
LEAK	1	1	.00	.00	.00	.00	36.67	264	264	264	264
TOTAL	1	1	.00	.00	.00	.00	36.67	264	264	264	264

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	CP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK OTHER 1/2 TO 1.99 IN.			45	2.017	6	14	7
				2.611			

FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
			FAILURES PER MILLION CALENDAR HOURS								
LEAK	3	2	.00	.00	.00	1.69	4.39	883	1197	883	726
HUNG CLOSE	2	1	.00	.00	.00	.00	1.69	216	385	216	46
OUT OF LIMITS	1	1	.00	.00	.00	.00	.85	582	582	582	582
TOTAL	6	2	.00	.00	.00	4.23	4.39	610	1197	610	46

CHECK OTHER 2 TO 3.99 IN.											
						76		3.438	3	22	9
								4.601			
LEAK	3	1	.00	.00	.00	.00	1.17	186	315	186	121
TOTAL	3	1	.00	.00	.00	.00	1.17	186	315	186	121

CHECK OTHER 4 TO 11.99 IN.											
						111		4.853	5	23	10
								6.812			
LEAK	4	2	.00	.00	.00	.00	1.01	78	168	78	7
CRACK	1	1	.00	.00	.00	.00	1.01	53	53	53	53
TOTAL	5	2	.00	.00	.00	.00	2.03	73	168	73	7

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
CHECK OTHER 12 TO 19.99 IN	94	4.487 5.221	49	15	5

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION * 25 TH PERCENTILE	MINIMUM	MEDIAN	CALENDAR HOURS 75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	29	4	.00	1.98	3.28	6.09	12.54	999	4191	998	25
PHYSICAL DISTORTION	3	1	.00	.00	.00	.00	1.98	143	228	143	54
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.66	89	89	89	89
MOV'T START/MOVE	1	1	.00	.00	.00	.00	.84	19	19	19	19
MOV'T CLOSE	8	2	.00	.00	.00	2.28	4.18	161	408	161	2
MOV'T OPEN	2	1	.00	.00	.00	.00	1.67	84	167	84	0
OUT OF LIMITS	4	2	.00	.00	.00	.66	3.28	1762	2356	1762	6
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.84	24	24	24	24
TOTAL	49	4	.00	5.29	6.55	8.37	20.06	776	4191	776	0

CHECK OTHER 20 TO 39.99 IN						3		.162 .197	7	1	1
OUT OF LIMITS	7	1	35.50	35.50	35.50	35.50	35.50	167	294	167	52
TOTAL	7	1	35.50	35.50	35.50	35.50	35.50	167	294	167	52

CHECK OTHER UNDEFINED						1		-- .057	0	1	1
CHECK UNDEFINED 1/2 TO 1.99 IN.						4		.130 .192	0	2	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
CHECK UNDEFINED 2 TO 3.99 IN.								7	.151 .191		0	5	5			
CHECK UNDEFINED 4 TO 11.99 IN.								10	.067 .451		0	3	3			
DIAPHRAGM MANUAL UNDER 1/2 IN.								7	-- .283		0	1	1			
DIAPHRAGM MANUAL 1/2 TO 1.99 IN.								98	3.113 4.892		1	19	14			
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	20.74				0	0	0	0	0	0
TOTAL	1	1	.00	.00	.00	.00	20.74				0	0	0	0	0	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIAPHRAGM MANUAL 2 TO 3.99 IN.			833	29.289	59	64	30
				39.945			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	50	8	.00	.00	.00	.37	9.59	183	987	183	0
CRACK	1	1	.00	.00	.00	.00	.15	52	52	52	52
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	1.92	760	760	760	760
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	1.75	7512	7512	7512	7512
FRACTURE/BREAK	4	2	.00	.00	.00	.00	1.65	62	100	62	24
WON'T START/MOVE	1	1	.00	.00	.00	.00	.56	647	647	647	647
TOTAL	58	9	.00	.00	.00	.38	11.51	317	7512	317	0

DIAPHRAGM MANUAL 4 TO 11.99 IN.			61	1.651	1	14	12				
				2.940							
FRACTURE/BREAK	1	1	.00	.00	.00	.00	16.28	2	2	2	2
TOTAL	1	1	.00	.00	.00	.00	16.28	2	2	2	2

DIAPHRAGM MANUAL UNDEFINED			15	.620	0	4	4				
				.760							

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN TH. NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
				11		4	6	4
DIAPHRAGM ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.				.539				
				.578				
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	4.72	35	35	35	35
FRACTURE/BREAK	1	1	.00	.00	.00	4.52	126	126	126	126
WON'T CLOSE	1	1	.00	.00	.00	4.72	83	83	83	83
WON'T OPEN	1	1	.00	.00	.00	32.60	80	80	80	80
TOTAL	4	3	.00	2.26	2.26	6.98	32.60	81	126	81	35
				9		.410	1	2		2
DIAPHRAGM ELECTRIC MOTOR/SERVO UNDEFINED						.427				
FRACTURE/BREAK	1	1	.00	.00	16.30	32.60	32.60	12	12	12	12
TOTAL	1	1	.00	.00	16.30	32.60	32.60	12	12	12	12
				2		.110	1	1		1
DIAPHRAGM PNEUMATIC/DIAPHRAGM/CYLINDER UNDER 1/2 IN.						.114				
LEAK	1	1	8.78	8.78	8.78	8.78	8.78	52	52	52	52
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78	52	52	52	52

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIAPHRAGM PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.	333	1.694 18.482	6	28	15

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	1	.00	.00	.00	.00	4.39	137	209	137	65
PHYSICAL DISTURTION	2	1	.00	.00	.00	.00	4.39	62	80	62	43
WON'T OPEN	1	1	.00	.00	.00	.00	2.19	25	25	25	25
SPURIJUS OPERATION	1	1	.00	.00	.00	.00	2.19	77	77	77	77
TOTAL	6	1	.00	.00	.00	.00	13.16	63	209	83	25

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIAPHRAGM PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.	171	5.105 7.734	26	70	27

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	18	8	.00	.00	.00	3.04	8.78	1545	6672	1545	1
CRACK	1	1	.00	.00	.00	.00	4.39	4	4	4	4
BREACH	1	1	.00	.00	.00	.00	1.52	5	5	5	5
PHYSICAL DISTURTION	2	2	.00	.00	.00	.00	2.93	651	1178	651	123
FRACTURE/BREAK	1	1	.00	.00	.00	.00	1.52	168	168	168	168
WON'T OPEN	2	2	.00	.00	.00	.00	1.69	89	168	89	9
LOW FLOW	1	1	.00	.00	.00	.00	4.52	595	595	595	595
TOTAL	26	10	.00	.00	.00	4.52	13.16	1156	6672	1156	1

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIAPHRAGM PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.	27	.962 1.356	11	10	10

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	4.39	2691	2691	2691	2691
PHYSICAL DISPLACEMENT	3	1	.00	.00	.00	.00	13.17	749	1231	749	497
WON'T CLOSE	1	1	.00	.00	.00	.00	4.39	1088	1088	1088	1088
WON'T OPEN	1	1	.00	.00	.00	.00	4.39	2214	2214	2214	2214
SPURIJUS OPERATION	3	1	.00	.00	.00	.00	13.17	989	1104	989	932
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	8.78	1477	2374	1477	579
TOTAL	11	1	.00	.00	.00	.00	48.27	1287	2691	1287	497

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
DIAPHRAGM PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN							.162	4		0	1	1
							.162					
DIAPHRAGM SOLENOID 1/2 TO 1.99 IN.							1.249	22		8	4	4
MOV'T CLOSE	1	1	.00	.00	.00	1.10	1			1	1	1
MOV'T OPEN	2	1	.00	.00	.00	2.19	325			624	325	26
OUT OF LIMITS	4	1	.00	.00	.00	4.39	661			1317	661	5
SPURIOUS OPERATION	1	1	.00	.00	.00	1.10	83			83	83	83
TOTAL	8	1	.00	.00	.00	8.78	422			1317	422	1
DIAPHRAGM SOLENOID 2 TO 3.99 IN.							.006	2		1	1	1
							.111					
LEAK	1	1	8.99	8.99	8.99	8.99	8.99			8	8	8
TOTAL	1	1	8.99	8.99	8.99	8.99	8.99			8	8	8
DIAPHRAGM SOLENOID 4 TO 11.99 IN.							.186	6		5	5	5
							.308					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
DIAPHRAGM SOLENOID 12 TO 19.99 IN											
COMPONENTS IN CATEGORY: 3								.091	10	1	1
OP/CALENDAR HOURS(MILLIONS): .112											
LEAK	3	1	26.85	26.85	26.85	26.85	26.85	189	279	189	13
WON'T CLOSE	1	1	8.95	8.95	8.95	8.95	8.95	550	550	550	550
OUT OF LIMITS	3	1	26.85	26.85	26.85	26.85	26.85	3	4	3	2
SPURIOUS OPERATION	3	1	26.85	26.85	26.85	26.85	26.85	913	1369	913	25
TOTAL	10	1	89.50	89.50	89.50	89.50	89.50	387	1369	387	2
DIAPHRAGM MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.											
COMPONENTS IN CATEGORY: 1								.023	1	1	1
OP/CALENDAR HOURS(MILLIONS): .057											
LEAK	1	1	17.56	17.56	17.56	17.56	17.56	1199	1198	1198	1198
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56	1198	1198	1198	1198
DIAPHRAGM MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.											
COMPONENTS IN CATEGORY: 12								.291	3	6	5
OP/CALENDAR HOURS(MILLIONS): .557											
LEAK	1	1	.00	.00	.00	.00	6.01	168	168	168	168
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	12.01	1952	3487	1952	416
TOTAL	3	1	.00	.00	.00	.00	18.02	1357	3487	1357	168
DIAPHRAGM MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.											
COMPONENTS IN CATEGORY: 2								--	0	1	1
OP/CALENDAR HOURS(MILLIONS): .067											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
DIAPHRAGM MOVE 12 TO 19.99 IN								2		.082 .112	0	2	2			
DIAPHRAGM BALL 1/2 TO 1.99 IN.								1		.055 .057	0	1	1			
DIAPHRAGM UNDEFINED 1/2 TO 1.99 IN.								1		.020 .031	0	1	1			
DIAPHRAGM UNDEFINED 2 TO 3.99 IN.								6		.118 .184	0	1	1			
DIAPHRAGM UNDEFINED 4 TO 11.99 IN.								6		.078 .184	0	2	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 251 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
GATE MANUAL UNDER 1/2 IN.								.096 .100	2		0	1	1			
GATE MANUAL 1/2 TO 1.99 IN.								26.152 80.904	1568		9	137	40			
LEAK	1	1	.00	.00	.00	.00	7.61	7200						7200	7200	7200
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	1.05	115						115	115	115
WON'T START/MOVE	3	2	.00	.00	.00	.00	2.13	617						1303	617	168
WON'T CLOSE	1	1	.00	.00	.00	.00	5.85	24						24	24	24
WON'T OPEN	2	2	.00	.00	.00	.00	32.60	21						21	21	21
OUT OF LIMITS	1	1	.00	.00	.00	.00	.92	293						293	293	293
TOTAL	9	7	.00	.00	.00	.00	32.60	1058						7200	1058	21
GATE MANUAL 2 TO 3.99 IN.								57.149 106.937	2378		41	326	60			
LEAK	16	9	.00	.00	.00	.00	5.07	1031						5935	1031	16
CRACK	2	2	.00	.00	.00	.00	.46	162						240	162	84
PHYSICAL DISTORTION	6	3	.00	.00	.00	.00	.92	112						551	112	3
PHYSICAL DISPLACEMENT	3	3	.00	.00	.00	.00	1.96	87						141	87	17
WON'T START/MOVE	1	1	.00	.00	.00	.00	.12	3						3	3	3
WON'T CLOSE	7	5	.00	.00	.00	.00	3.51	866						4820	866	10
WON'T OPEN	4	3	.00	.00	.00	.00	.90	536						1952	536	30
WON'T RELEASE	1	1	.00	.00	.00	.00	.12	95						95	95	95
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.45	208						208	208	208
TOTAL	41	16	.00	.00	.00	.00	5.07	641						5935	641	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

			FAILURES PER MILLION CALENDAR HOURS								
										OUT-OF-SERVICE HOURS	
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS		HIGHEST	AVERAGE	LOWEST
GATE MANUAL 4 TO 11.99 IN.												
						1968		48.361	16	325		57
								94.663				
LEAK	11	9	.00	.00	.00	.00	.72	2639		7875	2639	26
PHYSICAL DISTURTION	2	1	.00	.00	.00	.00	2.77	1224		1224	1224	1224
WON'T CLOSE	1	1	.00	.00	.00	.00	.15	152		152	152	152
WON'T OPEN	1	1	.00	.00	.00	.00	1.65	1894		1894	1894	1894
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.21	22		22	22	22
TOTAL	16	11	.00	.00	.00	.00	2.77	2096		7875	2096	22
GATE MANUAL 12 TO 19.99 IN												
						564		15.736	27	118		51
								27.671				
LEAK	18	5	.00	.00	.00	.00	11.71	583		1923	583	36
PHYSICAL DISTURTION	1	1	.00	.00	.00	.00	.90	40		40	40	40
WON'T START/MOVE	2	1	.00	.00	.00	.00	1.35	5		6	5	3
WON'T CLOSE	2	2	.00	.00	.00	.00	.68	87		122	87	52
WON'T OPEN	2	2	.00	.00	.00	.00	.90	42		50	42	34
OUT OF LIMITS	1	1	.00	.00	.00	.00	.34	16		16	16	16
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.34	3		3	3	3
TOTAL	27	7	.00	.00	.00	.00	11.71	401		1923	401	3
GATE MANUAL 20 TO 39.99 IN						60		.916	0	22		19
								2.333				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPROS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)			
									OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GATE MANUAL 40 TO 59.99 IN						5	.226 .235	0	2	2
GATE MANUAL UNDEFINED						96	2.955 5.032	1	18	13
LEAK	1	1	.00	.00	.00	.00	18.08	1200	1200	1200	1200
TOTAL	1	1	.00	.00	.00	.00	18.08	1200	1200	1200	1200
GATE ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.						93	2.464 4.230	6	30	17
LEAK	3	2	.00	.00	.00	.00	2.52	60	116	60	7
FRACTURE/BREAK	2	2	.00	.00	.00	.00	1.95	165	178	165	151
WON'T START/MOVE	1	1	.00	.00	.00	.00	1.26	80	80	80	80
TOTAL	6	2	.00	.00	.00	.00	5.04	98	178	98	7

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A01 (PART 2)
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.	585	14.223 26.058	66	201	60

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	36	17	.00	.00	.00	16.30	652	4128	652	1
PHYSICAL DISTURTION	1	1	.00	.00	.00	1.69	28	28	28	28
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.80	73	73	73
WON'T START/MOVE	6	3	.00	.00	.00	.00	13.75	610	2064	710	96
WON'T CLOSE	5	4	.00	.00	.00	.00	5.85	155	384	155	8
WON'T OPEN	6	5	.00	.00	.00	.00	2.28	125	3609	725	44
WON'T HOLD	3	2	.00	.00	.00	.00	2.98	777	1149	777	34
OUT OF LIMITS	3	2	.00	.00	.00	.00	7.02	226	336	226	5
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	1.69	408	571	408	244
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	1.53	218	218	218	218
FALSE RESPONSE	2	2	.00	.00	.00	.00	1.77	32	59	32	5
TOTAL	66	20	.00	.00	.00	.00	18.33	498	4128	562	1

GATE ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.	1451	36.076 69.739	84	306	57
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LEAK	33	19	.00	.00	.00	.95	4.50	1195	7728	1195	7
CRACK	2	1	.00	.00	.00	.00	1.38	161	177	161	145
BREACH	1	1	.00	.00	.00	.00	.73	159	159	159	159
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.44	1024	1024	1024	1024
WON'T START/MOVE	6	5	.00	.00	.00	.00	2.90	165	578	165	2
WON'T CLOSE	13	10	.00	.00	.00	.00	2.28	439	4687	439	0
WON'T OPEN	22	11	.00	.00	.00	.00	4.11	47	578	47	0
WON'T HOLD	1	1	.00	.00	.00	.00	1.26	507	507	507	507
WON'T RELEASE	1	1	.00	.00	.00	.00	.46	1661	1661	1661	1661
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	2.90	2	2	2	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.69	49	48	48	48
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.46	49	48	48	48
TOTAL	84	30	.00	.00	.44	1.94	7.24	606	7728	606	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE ELECTRIC MOTOR/SERVO 12 TO 19.99 IN			801	21.446 38.633	58	158	57

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	16	10	.00	.00	.00	2.53	387	1390	387	12
CRACK	1	1	.00	.00	.00	1.21	3916	3916	3916	3916
BREACH	1	1	.00	.00	.00	.81	407	407	407	407
PHYSICAL DISTORTION	3	3	.00	.00	.00	1.26	193	332	193	1
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.41	36	36	36	36
COLLAPSE	1	1	.00	.00	.00	2.29	26	26	26	26
FRACTURE/BREAK	1	1	.00	.00	.00	16.30	41	41	41	41
WON'T START/MOVE	6	3	.00	.00	.00	9.17	214	849	214	0
WON'T CLOSE	9	5	.00	.00	.00	2.05	107	728	107	0
WON'T OPEN	8	5	.00	.00	.00	5.00	15	72	15	0
OUT OF LIMITS	6	4	.00	.00	.00	2.83	31	72	31	4
SPURIOUS OPERATION	2	2	.00	.00	.00	1.41	2914	5803	2914	24
FALSE RESPONSE	3	2	.00	.00	.00	4.58	8	11	8	3
TOTAL	58	20	.00	.00	1.86	16.30	338	5803	338	0

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE ELECTRIC MOTOR/SERVO 20 TO 39.99 IN			271	5.391 12.472	17	48	29

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	9	3	.00	.00	.00	17.94	621	4872	621	2
PHYSICAL DISTORTION	2	1	.00	.00	.00	5.98	1	1	1	1
WON'T START/MOVE	1	1	.00	.00	.00	3.80	219	219	219	219
WON'T CLOSE	1	1	.00	.00	.00	2.99	28	28	28	28
WON'T OPEN	3	3	.00	.00	.00	4.39	107	296	107	3
WON'T HOLD	1	1	.00	.00	.00	2.99	2	2	2	2
TOTAL	17	5	.00	.00	.00	32.88	362	4872	362	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE								6		.067	0	4	3
ELECTRIC MOTOR/SERVO													
UNDEFINED										.335			
GATE								2		.085	0	2	2
HYDRAULIC													
1/2 TO 1.99 IN.										.094			
GATE								8		.267	0	5	4
HYDRAULIC													
2 TO 3.99 IN.										.399			
GATE								12		.465	0	8	8
HYDRAULIC													
4 TO 11.99 IN.										.525			
GATE								6		.055	1	2	2
HYDRAULIC													
12 TO 19.99 IN										.267			
MOV'T CLOSE	1	1	.00	.00	3.09	6.19	6.19		144		144	144	144
TOTAL	1	1	.00	.00	3.09	6.19	6.19		144		144	144	144

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION:

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.	64	1.160	2	26	14
		3.258			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	12.22	145	275	145	14
TOTAL	2	2	.00	.00	.00	12.22	145	275	145	14

GATE PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.	160	3.412	9	50	30
		6.786			
LEAK	5	3	.00	.00	.00	.00	9.13	846	2474	846	30
WON'T CLOSE	1	1	.00	.00	.00	.00	1.43	26	26	26	26
OUT OF LIMITS	2	1	.00	.00	.00	.00	8.78	3	3	3	3
FALSE RESPONSE	1	1	.00	.00	.00	.00	3.04	72	72	72	72
TOTAL	9	4	.00	.00	.00	.00	13.17	482	2474	482	3

GATE PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.	97	2.005	7	40	24
		4.330			
LEAK	7	5	.00	.00	.00	.00	15.22	430	792	430	24
TOTAL	7	5	.00	.00	.00	.00	15.22	430	792	430	24

GATE PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 17.99 IN	20	.502	0	7	6
		1.002			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN	26	.750 1.020	12	6	6

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	4	2	.00	.00	.00	7.61	18.02	458	1176	459	14
WON'T CLOSE	4	2	.00	.00	.00	7.61	22.83	349	1204	349	0
WON'T HOLD	1	1	.00	.00	.00	.00	7.61	0	0	0	0
OUT OF LIMITS	1	1	.00	.00	.00	.00	7.61	17	17	17	17
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	20.01	80	128	80	32
TOTAL	12	4	.00	.00	16.61	20.01	38.04	284	1204	284	0

GATE PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED	5	.086 .293	0	3	3

GATE SOLENOID 1/2 TO 1.99 IN.	33	.029 1.573	0	4	3

GATE SOLENOID 2 TO 3.99 IN.	11	.564 .569	0	2	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS						COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS				OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GATE SOLENOID 4 TO 11.99 IN.									23	1.211	36	6		6
								1.247						
LEAK	4	3	.00	.00	2.40	6.09	36.67	260				579	260	120
CRACK	4	1	.00	.00	.00	.00	12.17	4				4	4	4
FRACTURE/BREAK	1	1	.00	.00	.00	.00	36.67	768				768	768	768
WON'T CLOSE	3	3	.00	.00	1.52	4.39	4.81	479				1380	479	4
WON'T OPEN	18	4	.00	.00	11.61	14.42	35.12	87				495	87	4
OUT OF LIMITS	3	2	.00	.00	.00	3.04	9.61	938				2808	938	2
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	3.04	6				6	6	6
FALSE RESPONSE	1	1	.00	.00	.00	.00	4.81	2044				2044	2044	2044
BLOCKED OR STOPPED FL	1	1	.00	.00	.00	.00	4.39	11				11	11	11
TOTAL	36	5	.00	14.10	37.47	43.90	73.33	270				2808	270	2
GATE SOLENOID 12 TO 19.99 IN									2	.057	0	1		1
								.057						
GATE SOLENOID 20 TO 39.99 IN									1	.042	0	1		1
								.042						
GATE FLOAT 2 TO 3.99 IN.									2	--	0	1		1
								.131						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS (MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GATE EXPLOSIVE,SQUIB 1/2 TO 1.99 IN.								8	.171 .348		0	4	4			
GATE EXPLOSIVE,SQUIB 2 TO 3.99 IN.								2	.067 .067		0	1	1			
GATE MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.								2	-- .114		0	1	1			
GATE MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.								7	.200 .241		1	2	2			
LEAK	1	1	.00	.00	12.16	24.33	24.33			295	295	295	295			
TOTAL	1	1	.00	.00	12.16	24.33	24.33			295	295	295	295			
GATE MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.								1	.037 .055		1	1	1			
LEAK	1	1	18.03	18.03	18.03	18.03	18.03			1872	1872	1872	1872			
TOTAL	1	1	18.03	18.03	18.03	18.03	18.03			1872	1872	1872	1872			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GATE MECH.(DIFF.PRES.TO O/S FORCE CL) 20 TO 39.99 IN							4		.108 .149	0	2	2			
GATE NONE 1/2 TO 1.99 IN.							2		-- .112	0	1	1			
GATE NONE 2 TO 3.99 IN.							10		.262 .420	0	5	4			
GATE NONE 4 TO 11.99 IN.							7		.186 .296	1	5	5			
LEAK	1	1	.00	.00	.00	.00	17.55		*	8	8	8			
TOTAL	1	1	.00	.00	.00	.00	17.55		*	8	8	8			
GATE NONE 12 TO 19.99 IN							8		-- .439	0	2	2			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GATE PISTON 2 TO 3.99 IN.	2						.032 .111	0	2	1
GATE PISTON 4 TO 11.99 IN.	1						.051 .055	0	1	1
GATE OTHER 2 TO 3.99 IN.	1						.002 .018	0	1	1
GATE OTHER 4 TO 11.99 IN.	13						.036 .228	0	3	1
GATE OTHER 20 TO 39.99 IN	8						.218 .276	0	2	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GATE													
UNDEFINED								10	.386		0	3	2
1/2 TO 1.99 IN.									.397				
GATE													
UNDEFINED								4	.060		0	1	1
2 TO 3.99 IN.									.210				
GATE													
UNDEFINED								1	.050		0	1	1
UNDEFINED									.057				
GLOBE													
MANUAL								31	.817		0	7	5
UNDER 1/2 IN.									1.577				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE MANUAL 1/2 TO 1.99 IN.			2952	89.610 148.449	27	212	54

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	18	7	.00	.00	.00	.00	1.76	1268	5729	1268	14
CRACK	1	1	.00	.00	.00	.00	.11	158	158	158	158
PHYSICAL DISTORTION	2	2	.00	.00	.00	.00	.19	512	576	512	447
WON'T START/MOVE	2	2	.00	.00	.00	.00	1.17	255	487	255	23
WON'T CLOSE	1	1	.00	.00	.00	.00	.11	80	80	80	80
OUT OF LIMITS	1	1	.00	.00	.00	.00	.66	8	8	8	8
FLOW LEAK	1	1	.00	.00	.00	.00	2.53	18	18	18	18
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.19	939	939	939	939
TOTAL	27	9	.00	.00	.00	.00	2.53	946	5729	946	8

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE MANUAL 2 TO 3.99 IN.			2741	70.932 128.382	27	329	58

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	13	10	.00	.00	.00	.00	1.00	361	2263	372	1
CRACK	1	1	.00	.00	.00	.00	.17	220	220	220	220
BREACH	2	1	.00	.00	.00	.00	.23	4101	8092	4101	110
PHYSICAL DISTORTION	2	1	.00	.00	.00	.00	.47	72	72	72	72
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.17	264	264	264	264
FRACTURE/BREAK	2	2	.00	.00	.00	.00	.82	39	47	39	30
WON'T START/MOVE	2	1	.00	.00	.00	.00	.47	2066	3888	2066	244
WON'T CLOSE	1	1	.00	.00	.00	.00	.17	5	5	5	5
WON'T OPEN	2	2	.00	.00	.00	.00	.17	56	97	56	14
WON'T HOLD	1	1	.00	.00	.00	.00	.24	7708	7708	7708	7708
TOTAL	27	14	.00	.00	.00	.00	1.00	947	8092	952	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GLOBE MANUAL 4 TO 11.99 IN.							6.515	241		4	89	38			
							11.755								
LEAK	2	2	.00	.00	.00	8.78	1586						3144	1586	27
FRACTURE/BREAK	1	1	.00	.00	.00	10.01	42						42	42	42
WON'T CLOSE	1	1	.00	.00	.00	2.19	26						26	26	26
TOTAL	4	4	.00	.00	.00	10.01	810						3144	810	26
GLOBE MANUAL 12 TO 19.99 IN							.441	23		0	10	7			
							1.160								
GLOBE MANUAL 20 TO 39.99 IN							--	1		1	1	1			
							.057								
SPURIOUS OPERATION	1	1	17.56	17.56	17.56	17.56	2712						2712	2712	2712
TOTAL	1	1	17.56	17.56	17.56	17.56	2712						2712	2712	2712
GLOBE MANUAL OVER 60 IN							.039	1		0	1	1			
							.050								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE MANUAL UNDEFINED			32	1.253 .334 1.587	0	6	5
GLOBE ELECTRIC MOTOR/SERVO UNDER 1/2 IN.			1	-- .050	0	1	1
GLOBE ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.			131	3.560 2.210 5.770	11	36	23

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
LEAK	4	3	.00	.00	.00	.00	3.34	1378	5469	1378	8
WON'T START/MOVE	2	1	.00	.00	.00	.00	6.90	754	1491	754	17
WON'T CLOSE	1	1	.00	.00	.00	.00	2.17	32	32	32	32
WON'T OPEN	1	1	.00	.00	.00	.00	3.67	4	4	4	4
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	6.01	4959	4959	4959	4959
OTHER (SEE REMARKS)	2	1	.00	.00	.00	.00	2.75	48	48	48	48
TOTAL	11	7	.00	.00	.00	2.73	6.90	1101	5469	1101	4

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* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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GLOBE ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.			485	11.517 22.357	34	143	51
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	17	8	.00	.00	.00	14.42	943	5040	943	1
CRACK	1	1	.00	.00	.00	1.26	51	51	51	51
PHYSICAL DISTORTION	1	1	.00	.00	.00	1.26	77	77	77	77
WON'T START/MOVE	2	2	.00	.00	.00	4.65	18	32	18	4
WON'T CLOSE	6	6	.00	.00	.00	2.93	281	1553	281	2
WON'T OPEN	5	5	.00	.00	.00	3.51	97	288	97	0
WON'T HOLD	1	1	.00	.00	.00	1.07	10	10	10	10
SPURIOUS OPERATION	1	1	.00	.00	.00	7.33	552	552	552	552
TOTAL	34	19	.00	.00	.00	2.23	14.42	557	5040	557	0
GLOBE ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.					255		5.238 11.604	22	111		44
LEAK	4	4	.00	.00	.00	.00	2.88	1076	3312	1076	42
CRACK	2	1	.00	.00	.00	.00	3.56	35	58	35	11
PHYSICAL DISTORTION	3	2	.00	.00	.00	.00	4.72	111	145	111	42
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	2.20	839	839	839	839
WON'T START/MOVE	4	2	.00	.00	.00	.00	7.08	70	122	70	7
WON'T STOP	1	1	.00	.00	.00	.00	2.01	528	528	528	528
WON'T CLOSE	4	3	.00	.00	.00	.00	8.78	311	1210	311	3
WON'T OPEN	1	1	.00	.00	.00	.00	2.20	26	26	26	26
OUT OF LIMITS	1	1	.00	.00	.00	.00	2.17	53	53	53	53
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	4.73	170	170	170	170
TOTAL	22	12	.00	.00	.00	.00	14.16	357	3312	357	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)			OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GLOBE ELECTRIC MOTOR/SERVO 12 TO 19.99 IN						103	3.507 / 5.099		15	32		18
LEAK	8	5	.00	.00	.00	2.96	26.33	224		651	224	24
BREACH	1	1	.00	.00	.00	.00	3.26	41		41	41	41
FRACTURE/BREAK	2	1	.00	.00	.00	.00	8.78	24		24	24	23
WON'T CLOSE	1	1	.00	.00	.00	.00	3.26	76		76	76	76
WON'T OPEN	3	2	.00	.00	.00	.00	17.55	9		17	9	4
OUT OF LIMITS	2	2	.00	.00	.00	.00	2.96	380		724	380	36
FLOW LEAK	1	1	.00	.00	.00	.00	4.39	24		24	24	24
TOTAL	18	8	.00	.00	.00	6.52	43.89	154		724	154	4
GLOBE ELECTRIC MOTOR/SERVO 20 TO 39.99 IN						20	.150 / .736		0	8		8
GLOBE ELECTRIC MOTOR/SERVO UNDEFINED						4	.110 / .219		0	3		3
GLOBE HYDRAULIC 1/2 TO 1.99 IN.						2	.107 / .107		0	2		2

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			MINIMUM						OUT-OF-SERVICE HOURS HIGHEST / AVERAGE / LOWEST	
GLOBE HYDRAULIC 2 TO 3.99 IN.					8		.250	1	4	4
							.349			
OUT OF LIMITS	1	1	.00	.00	.00	8.78	8	8	8	8
TOTAL	1	1	.00	.00	.00	8.78	8	8	8	8
GLOBE HYDRAULIC 4 TO 11.99 IN.					23		--	11	5	4
							1.065			
LEAK	4	1	.00	.00	.00	9.21	36	48	36	24
CRACK	2	1	.00	.00	.00	35.10	26	27	26	24
WON'T START/MOVE	1	1	.00	.00	.00	16.28	128	128	128	128
WON'T OPEN	1	1	.00	.00	.00	1.95	183	183	183	183
SPURIOUS OPERATION	2	1	.00	.00	.00	3.90	72	131	72	12
WON'T CONTROL	1	1	.00	.00	.00	17.55	2	2	2	2
TOTAL	11	4	5.85	7.53	7.53	12.74	52.65	59	183	59
GLOBE HYDRAULIC 12 TO 19.99 IN					2		.095	6	1	1
							.099			
LEAK	3	1	30.31	30.31	30.31	30.31	30.31	88	148	88	29
WON'T START/MOVE	1	1	10.10	10.10	10.10	10.10	10.10	795	795	795	795
OUT OF LIMITS	1	1	10.10	10.10	10.10	10.10	10.10	7	7	7	7
SPURIOUS OPERATION	1	1	10.10	10.10	10.10	10.10	10.10	861	861	861	861
TOTAL	6	1	60.62	60.62	60.62	60.62	60.62	321	861	321	7

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)			OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GLOBE HYDRAULIC 20 TO 34.99 IN						8		.328	1	2		2
								.447				
MOV'T CLOSE	1	1	.00	.00	2.28	4.57	4.57	5		5	5	5
TOTAL	1	1	.00	.00	2.28	4.57	4.57	5		5	5	5
GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER UNDER 1/2 IN.						13		.269	0	3		3
								.429				
GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.						1462		26.422	35	116		43
								78.177				
LEAK	14	8	.00	.00	.00	.00	5.53	231		1240	231	1
PHYSICAL DISTORTION	2	2	.00	.00	.00	.00	1.38	37		68	37	6
MOV'T START/MOVE	2	2	.00	.00	.00	.00	3.78	18		24	18	12
MOV'T CLOSE	8	5	.00	.00	.00	.00	3.78	280		1584	280	6
MOV'T HOLD	4	1	.00	.00	.00	.00	4.49	1255		1648	1255	76
OUT OF LIMITS	1	1	.00	.00	.00	.00	2.93	0		0	0	0
FALSE RESPONSE	3	2	.00	.00	.00	.00	1.85	1953		5405	1953	20
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	3.83	146		146	146	146
TOTAL	35	14	.00	.00	.00	1.05	8.30	475		5405	475	0

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.			900	24.229 / 42.291	135	198	52
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	82	20	.00	.00	.00	.00	9.44	1009	5574	1009	2
CRACK	3	3	.00	.00	.00	.00	.92	1301	3794	1301	80
BREACH	1	1	.00	.00	.00	.00	9.01	144	144	144	144
PHYSICAL DISTORTION	4	4	.00	.00	.00	.00	.94	1636	6363	1634	6
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.73	5	5	5	5
WON'T START/MOVE	5	4	.00	.00	.00	.00	9.01	197	569	197	16
WON'T CLOSE	9	7	.00	.00	.00	.00	3.04	287	1656	287	1
WON'T OPEN	11	8	.00	.00	.00	.00	6.30	767	2736	767	1
WON'T HOLD	6	3	.00	.00	.00	.00	5.05	393	960	393	8
OUT OF LIMITS	2	2	.00	.00	.00	.00	6.03	460	908	460	12
OUT OF ADJUSTMENT	4	2	.00	.00	.00	.00	6.30	84	228	84	2
SPURIOUS OPERATION	3	3	.00	.00	.00	.00	6.03	468	696	468	311
CORROSION	1	1	.00	.00	.00	.00	.88	104	104	104	104
HIGH LEAKAGE	1	1	.00	.00	.00	.00	3.45	21	21	21	21
OTHER (SEE REMARKS)	2	2	.00	.00	.00	.00	1.68	776	1527	776	24
TOTAL	135	27	.00	.00	.00	.00	18.88	830	6363	830	1
GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.			286	6.999 / 12.847	68	91	45
LEAK	37	11	.00	.00	.00	.00	21.94	1140	6076	1140	35
CRACK	1	1	.00	.00	.00	.00	2.54	28	28	28	28
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	6.01	101	101	101	101
WON'T START/MOVE	3	3	.00	.00	.00	.00	7.61	259	606	259	2
WON'T CLOSE	5	4	.00	.00	.00	.00	9.46	158	562	158	4
WON'T OPEN	10	4	.00	.00	.00	.00	45.64	1130	4497	1130	1
WON'T HOLD	4	2	.00	.00	.00	.00	7.60	1179	3654	1179	11
OUT OF LIMITS	2	1	.00	.00	.00	.00	2.19	11	19	11	3
OUT OF ADJUSTMENT	3	3	.00	.00	.00	.00	7.61	1399	4014	1399	9
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	6.01	132	139	132	125
TOTAL	68	15	.00	.00	.00	5.07	76.07	947	6076	947	1

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** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN	77	2.996 4.078	66	20	18

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	31	6	.00	.00	.00	9.13	17.55	1606	7009	1606	5
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	3.04	3045	3045	3045	3045
FRACTURE/BREAK	1	1	.00	.00	.00	.00	8.78	9	9	9	9
MOV'T START/MOVE	1	1	.00	.00	.00	.00	3.00	1	1	1	1
MOV'T CLOSE	2	2	.00	.00	.00	.00	8.78	45	80	45	9
MOV'T OPEN	1	1	.00	.00	.00	.00	9.13	16	16	16	16
OUT OF LIMITS	22	3	.00	.00	.00	.00	27.03	507	2518	507	1
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	3.04	13	13	13	13
SPURIOUS OPERATION	3	3	.00	.00	.00	.00	3.00	92	208	92	8
FALSE RESPONSE	3	2	.00	.00	.00	.00	6.01	916	2719	916	4
TOTAL	66	9	.00	.00	2.19	17.55	51.05	1017	7009	1017	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN	62	1.252 2.954	11	9	9

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	7	3	.00	.00	.00	4.39	8.79	1480	2384	1480	548
FRACTURE/BREAK	1	1	.00	.00	.00	.00	2.20	591	591	591	591
OUT OF LIMITS	1	1	.00	.00	.00	.00	4.39	2	2	2	2
FLOW LEAK	2	1	.00	.00	.00	.00	4.39	24	24	24	24
TOTAL	11	4	.00	.00	.00	7.92	8.79	1000	2384	1000	2

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED	11	.493 .563	1	6	5

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	4.39	31	31	31	31
TOTAL	1	1	.00	.00	.00	.00	4.39	31	31	31	31

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COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GLOBE SOLENOID UNDER 1/2 IN.											
COMPONENTS IN CATEGORY: 2							—	1	1		1
OP/CALENDAR HOURS (MILLIONS): .114											
WON'T OPEN	1	1	8.78	8.78	8.78	8.78	8.78	6279	6279	6279	6279
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78	6279	6279	6279	6279
GLOBE SOLENOID 1/2 TO 1.99 IN.											
COMPONENTS IN CATEGORY: 51							.254	0	11		9
OP/CALENDAR HOURS (MILLIONS): 2.192											
GLOBE SOLENOID 2 TO 3.99 IN.											
COMPONENTS IN CATEGORY: 64							1.382	4	16		12
OP/CALENDAR HOURS (MILLIONS): 2.577											
LEAK	1	1	.00	.00	.00	.00	4.39	16	16	16	16
WON'T CLOSE	1	1	.00	.00	.00	.00	1.12	5	5	5	5
WON'T HOLD	2	2	.00	.00	.00	.00	15.21	1919	2598	1919	1240
TOTAL	4	3	.00	.00	.00	.00	15.21	965	2598	965	5

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GLOBE SOLENOID 4 TO 11.99 IN.			55	1.000	24	8	4
				1.951			
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	7	2	.00	.00	1.17	19.02	532	1501	532	40
CRACK	1	1	.00	.00	.00	2.88	681	681	681	681
WON'T START/MOVE	3	2	.00	.00	.39	5.76	334	773	334	14
WON'T OPEN	4	2	.00	.00	.78	5.76	509	1654	509	12
OUT OF LIMITS	1	1	.00	.00	.00	20.17	244	244	244	244
SPURIOUS OPERATION	2	1	.00	.00	.00	9.51	492	981	492	2
TOTAL	24	3	.00	2.34	2.34	16.61	34.57	422	1654	422
GLOBE SOLENOID 12 TO 19.99 IN			1	.004	0	1	1			
				.033						
GLOBE SOLENOID UNDEFINED			10	.008	1	2	2			
				.287						
LEAK	1	1	.00	.00	45.16	90.33	90.33	9	8	8	8
TOTAL	1	1	.00	.00	45.16	90.33	90.33	8	8	8	8
GLOBE EXPLOSIVE,SQUIB 1/2 TO 1.99 IN.			10	.186	0	5	5			
				.501						

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COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
GLOBE																
EXPLOSIVE,SQUIB									3							
UNDEFINED								.149			0	1	1			
								.164								
GLOBE																
MECH.(DIFF.PRES.TO O/S FORCE CL)									42							
1/2 TO 1.99 IN.								1.217			6	12	11			
								2.222								
LEAK	2	1	.00	.00	.00	.00	3.04	14						20	14	7
FRACTURE/BREAK	1	1	.00	.00	.00	.00	25.48	2						2	2	2
WON'T CLOSE	2	1	.00	.00	.00	.00	3.19	46						77	46	14
OUT OF LIMITS	1	1	.00	.00	.00	.00	5.85	2852						2852	2852	2852
TOTAL	6	4	.00	.00	.00	3.19	25.48	495						2852	495	2
GLOBE																
MECH.(DIFF.PRES.TO O/S FORCE CL)									68							
2 TO 3.99 IN.								2.261			6	25	16			
								3.266								
LEAK	4	2	.00	.00	.00	.00	2.34	237						360	237	72
WON'T START/MOVE	1	1	.00	.00	.00	.00	6.09	17						17	17	17
WON'T OPEN	1	1	.00	.00	.00	.00	1.14	4						4	4	4
TOTAL	6	3	.00	.00	.00	.00	6.09	161						360	161	4

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
GLOBE MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.			64	1.778	11	14	14
				3.002			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	6	3	.00	.00	.00	.00	30.43	154	661	154	8
CRACK	1	1	.00	.00	.00	.00	2.93	46	46	46	46
WON'T CLOSE	2	2	.00	.00	.00	.00	17.55	37	44	37	30
WON'T OPEN	1	1	.00	.00	.00	.00	17.55	11	11	11	11
OUT OF LIMITS	1	1	.00	.00	.00	.00	3.65	16	16	16	16
TOTAL	11	6	.00	.00	.00	11.70	30.43	97	661	97	8

GLOBE MECH.(DIFF.PRES.TO O/S FORCE CL) 12 TO 19.99 IN	13	.502	4	2	2
		.717			

LEAK	2	1	.00	.00	1.66	3.32	3.32	360	360	360	360
WON'T CLOSE	2	1	.00	.00	8.78	17.56	17.56	2	3	2	1
TOTAL	4	2	3.32	3.32	10.44	17.56	17.56	181	360	181	1

GLOBE MECH.(DIFF.PRES.TO O/S FORCE CL) 20 TO 39.99 IN	1	--	0	1	1
		.033			

GLOBE MOVE 1/2 TO 1.99 IN.	2	.001	0	2	2
		.069			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GLOBE																
NONE									10							
2 TO 3.99 IN.								.301			1	6	5			
								.454								
MOV'T OPEN	1	1	.00	.00	.00	.00	13.06	456								
TOTAL	1	1	.00	.00	.00	.00	13.06	456						456	456	456
								456						456	456	456
GLOBE																
OTHER																
1/2 TO 1.99 IN.								.276	10		0	4	4			
								.387								
GLOBE																
OTHER																
2 TO 3.99 IN.								.057	7		2	4	4			
								.326								
MOV'T OPEN	1	1	.00	.00	.00	.00	9.13	152								
FALSE RESPONSE	1	1	.00	.00	.00	.00	9.13	152								
TOTAL	2	1	.00	.00	.00	.00	18.25	152						152	152	152
								152						152	152	152
GLOBE																
OTHER																
4 TO 11.99 IN.								--	2		0	1	1			
								.035								

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
GLOBE															
OTHER							2		.086	1	1	1			
12 TO 19.99 IN									.028						
									.114						
WON'T CLOSE	1	1	8.78	8.78	8.78	8.78	8.78			2	2	2	2		
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78			2	2	2	2		
GLOBE															
UNDEFINED							4		--	0	1	1			
UNDER 1/2 IN.									.123						
GLOBE															
UNDEFINED							4		.100	0	2	2			
1/2 TO 1.99 IN.									.053						
									.153						
GLOBE															
UNDEFINED							1		.057	0	1	1			
UNDEFINED															
									.057						
NEEDLE															
MANUAL							7		.276	1	3	3			
UNDER 1/2 IN.									.090						
									.366						
SPURIOUS OPERATION	1	1	.00	.00	.00	4.39	4.39			2	2	2	2		
TOTAL	1	1	.00	.00	.00	4.39	4.39			2	2	2	2		

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
NEEDLE MANUAL 1/2 TO 1.99 IN.									189		4	15	14
								8.246					
								10.475					
LEAK	2	1	.00	.00	.00	.00	5.28	31					
FRACTURE/BREAK	2	1	.00	.00	.00	.00	5.10	11					
TOTAL	4	2	.00	.00	.00	.00	5.28	21			42	31	19
											11	11	10
											42	21	10
NEEDLE MANUAL 2 TO 3.99 IN.									4		0	1	1
								.143					
								.152					
NEEDLE MANUAL 4 TO 11.99 IN.									20		1	4	3
								1.105					
								1.109					
LEAK	1	1	.00	.00	.00	1.51	1.51	7					
TOTAL	1	1	.00	.00	.00	1.51	1.51	7			7	7	7
											7	7	7
NEEDLE MANUAL UNDEFINED									1		0	1	1
								--					
								.031					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
NEEDLE ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.								2	.093 .114		0	1	1			
NEEDLE ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.								12	.373 .671		0	2	2			
NEEDLE HYDRAULIC 1/2 TO 1.99 IN.								20	1.123 1.122		10	4	2			
LEAK	2	2	1.27	1.27	2.13	3.00	3.00			1395				2764	1395	26
OUT OF LIMITS	8	2	6.01	6.01	6.81	7.61	7.61			349				1224	349	5
TOTAL	10	2	8.88	8.88	8.94	9.01	9.01			558				2764	558	5
NEEDLE HYDRAULIC 4 TO 11.99 IN.								12	.385 .609		3	3	3			
MOVET CLOSE	2	1	.00	.00	.00	8.01	8.01			49				73	49	24
OUT OF LIMITS	1	1	.00	.00	.00	4.00	4.00			2355				2355	2355	2355
TOTAL	3	1	.00	.00	.00	12.01	12.01			817				2355	817	24

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
NEEDLE PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.								.231 .338	8		0	4	4			
NEEDLE PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.								.103 .114	2		0	1	1			
NEEDLE SOLENOID UNDER 1/2 IN.								-- .299	5		1	1	1			
WON'T CLOSE	1	1	3.34	3.34	3.34	3.34	3.34				6		6	6		6
TOTAL	1	1	3.34	3.34	3.34	3.34	3.34				6		6	6		6
NEEDLE SOLENOID 1/2 TO 1.99 IN.								-- .048	1		2	1	1			
LEAK	1	1	20.75	20.75	20.75	20.75	20.75				48		48	48		48
WON'T CLOSE	1	1	20.75	20.75	20.75	20.75	20.75				0		0	0		0
TOTAL	2	1	41.50	41.50	41.50	41.50	41.50				24		48	24		0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
NEEDLE MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.								9	.193 .417		0	5	4			
NEEDLE MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.								8	.191 .270		0	4	2			
NEEDLE MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.								39	.793 1.888		0	4	4			
NEEDLE NONE UNDER 1/2 IN.								2	.037 .054		0	1	1			
NEEDLE NONE 4 TO 11.99 IN.								3	.091 .091		0	1	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
NEEDLE OTHER 2 TO 3.99 IN.								2	.044 .044		0	1	1			
PLUG MANUAL 1/2 TO 1.99 IN.								4	.147 .149		0	2	2			
PLUG MANUAL 2 TO 3.99 IN.								13	.156 .596		0	5	5			
PLUG MANUAL 4 TO 11.99 IN.								11	.017 .480		0	3	3			
PLUG ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.								4	.147 .149		0	2	2			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS (MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PLUG ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.								3	.099 .123		0	2	2			
PLUG ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.								1	.029 .035		0	1	1			
PLUG ELECTRIC MOTOR/SERVO 20 TO 39.99 IN								4	.023 .149		0	2	2			
PLUG HYDRAULIC 2 TO 3.99 IN.								2	-- .114		2	2	2			
MOV'T STOP	1	1	.00	.00	9.78	17.56	17.56			6		6	6	6		6
MOV'T OPEN	1	1	.00	.00	9.78	17.56	17.56			40		40	40	40		40
TOTAL	2	2	17.56	17.56	17.56	17.56	17.56			23		40	23			6

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PLUG HYDRAULIC 4 TO 11.99 IN.								2		--	1	1	1			
										.114						
WON'T OPEN	1	1	8.78	8.78	8.78	8.78	8.78			8				8	8	8
TOTAL	1	1	8.78	8.78	8.78	8.78	8.78			8				8	8	8
PLUG PNEUMATIC/DIAPHRAGM/CYLINDER UNDER 1/2 IN.								1		--	1	1	1			
										.031						
WON'T CLOSE	1	1	32.60	32.60	32.60	32.60	32.60			2				2	2	2
TOTAL	1	1	32.60	32.60	32.60	32.60	32.60			2				2	2	2
PLUG PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.								4		.116	0	3	3			
										.237						
PLUG PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.								56		2.100	2	14	8			
										2.997						
LEAK	1	1	.00	.00	.00	.00	6.31			44				44	44	44
FRACTURE/BREAK	1	1	.00	.00	.00	.00	32.60			16				16	16	16
TOTAL	2	2	.00	.00	.00	.00	32.60			30				44	30	16

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)				
PLUG PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.						33	1.079 1.608		7	14	11
LEAK	7	3	.00	.00	.00	12.38	30.03	474		1128	474	50
TOTAL	7	3	.00	.00	.00	12.38	30.03	474		1128	474	50
PLUG PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN						7	.303 .377		0	3	3
PLUG SOLENOID UNDER 1/2 IN.						101	1.506 5.752		9	17	3
LEAK	5	2	.00	.00	.24	2.60	2.60	326		1597	326	8
WON'T START/MOVE	1	1	.00	.00	.00	.65	.65	34		34	34	34
WON'T OPEN	1	1	.00	.00	.00	.24	.24	938		938	938	938
SPURIOUS OPERATION	1	1	.00	.00	.00	.24	.24	990		990	990	990
TOTAL	8	2	.00	.00	.73	3.25	3.25	449		1597	449	8
PLUG SOLENOID 1/2 TO 1.99 IN.						584	.136 33.180		1	7	3
WON'T OPEN	1	1	.00	.00	.00	.55	.55	2140		2140	2140	2140
TOTAL	1	1	.00	.00	.00	.55	.55	2140		2140	2140	2140

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
PLUG SOLENOID 2 TO 3.99 IN.	20	.664	0	6	4
		1.042			
PLUG SOLENOID 4 TO 11.99 IN.	13	.009	0	3	3
		.583			
PLUG SOLENOID UNDEFINED	7	.093	0	3	2
		.399			
PLUG EXPLOSIVE,SQUIB 1/2 TO 1.99 IN.	13	.320	0	7	7
		.628			
PLUG EXPLOSIVE,SQUIB UNDEFINED	2	--	0	1	1
		.110			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
PLUG MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.	170	5.408 9.334	9	27	9

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	2	2	.00	.00	.00	.00	.82	1257	2249	1257	264
WON'T CLOSE	1	1	.00	.00	.00	.00	.30	5390	5390	5390	5390
OUT OF LIMITS	2	1	.00	.00	.00	.00	17.56	24	24	24	24
OUT OF ADJUSTMENT	4	2	.00	.00	.00	.00	17.56	10	23	10	1
TOTAL	9	5	.00	.00	.30	.92	35.12	888	5390	888	1

PLUG MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.						63		1.526 3.159	30	20	15
LEAK	28	6	.00	.00	.00	9.46	19.10	1253	6075	1253	7
WON'T OPEN	1	1	.00	.00	.00	.00	18.25	24	24	24	24
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.94	1682	1682	1682	1682
TOTAL	30	7	.00	.00	.00	15.11	19.43	1227	6075	1227	7

PLUG MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.						60		2.083 3.251	4	10	10
WON'T CLOSE	1	1	.00	.00	.00	.00	5.85	1	1	1	1
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.76	244	244	244	244
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	3.52	71	86	71	55
TOTAL	4	2	.00	.00	.00	.00	5.85	97	244	97	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPROS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	AVERAGE RESTORATION HOURS	NUMBER OF SYSTEMS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST	NUMBER OF UNITS
PLUG MECH.(DIFF.PRES.TO U/S FORCE CL) UNDEFINED								4			.106	1		2		2
											.215					
LEAK	1	1		.00	.00	4.72	9.44				403			403		403
TOTAL	1	1		.00	.00	4.72	9.44				403			403		403
PLUG NONE 4 TO 11.99 IN.								9			.034	0		3		3
											.388					
PLUG UNDEFINED 4 TO 11.99 IN.								6			--	0		1		1
											.184					
NOZZLE ELECTRIC MOTOR/SERVO 12 TO 19.99 IN								16			.313	1		5		5
											.841					
FRACTURE/BREAK	1	1		.00	.00	.00	.00	8.89			8			8		8
TOTAL	1	1		.00	.00	.00	.00	8.89			8			8		8

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
NOZZLE HYDRAULIC 4 TO 11.99 IN.								1		-- / .057	0	1	1			
NOZZLE SOLENOID 2 TO 3.99 IN.								1		— / .040	0	1	1			
NOZZLE EXPLOSIVE,SQUIB 2 TO 3.99 IN.								1		.053 / .053	0	1	1			
NOZZLE MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.								59		2.199 / 2.647	21	23	11			
LEAK	11	5	.00	.00	1.75	7.61	20.21			574				4887	591	13
WON'T CLOSE	3	2	.00	.00	.00	.00	15.21			110				270	110	28
WON'T HOLD	3	2	.00	.00	.00	.00	13.47			223				364	223	106
OUT OF LIMITS	1	1	.00	.00	.00	.00	2.51			48				48	49	48
OUT OF ADJUSTMENT	2	2	.00	.00	.00	.00	7.61			137				228	137	46
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	7.61			124				124	124	124
TOTAL	21	6	.00	.00	1.75	8.89	47.15			369				4887	378	13

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
NOZZLE MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.			88	3.269 4.235	13	37	20
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	11	9	.00	.00	.00	.00	26.85	2653	8144	2653	6
OUT OF LIMITS	1	1	.00	.00	.00	.00	1.35	24	24	24	24
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	18.25	11	11	11	11
TOTAL	13	9	.00	.00	.00	.00	26.85	2247	8144	2247	6
NOZZLE MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.			208	7.000 9.374	33	24	16
LEAK	7	3	.00	.00	.00	.00	10.19	213	262	213	78
FRACTURE/BREAK	2	1	.00	.00	.00	.00	4.07	51	51	51	51
OUT OF LIMITS	18	1	.00	.00	.00	.00	36.67	11	17	11	4
OUT OF ADJUSTMENT	6	1	.00	.00	.00	.00	12.22	352	373	352	309
TOTAL	33	3	.00	.00	.00	.00	63.15	118	373	118	4
NOZZLE NONE 1/2 TO 1.99 IN.			7	-- .249	1	2	2
LEAK	1	1	.00	.00	4.39	8.78	8.78	74	74	74	74
TOTAL	1	1	.00	.00	4.39	8.78	8.78	74	74	74	74

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
NOZZLE NONE 2 TO 3.99 IN.	4	.155 .198	1	2	2

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	2.92	5.85	5.85	174	174	174	174
TOTAL	1	1	.00	.00	2.92	5.85	5.85	174	174	174	174

NOZZLE NONE 4 TO 11.99 IN.	35	1.092 1.399	10	3	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T HOLD	10	2	.00	.00	1.90	11.36	11.36	856	3673	856	28
TOTAL	10	2	.00	.00	1.90	11.36	11.36	856	3673	856	28

NOZZLE UNDEFINED UNDEFINED	1	— .031	0	1	1

SINGLE BLADE ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.	2	.027 .055	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						AVERAGE RESTORATION HOURS			OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SINGLE BLADE ELECTRIC MOTOR/SERVO OVER 60 IN						.027	4		0	1	1
						.027					
SINGLE BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.						.036	32		0	2	2
						1.192					
SINGLE BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN						.220	4		0	1	1
						.220					
SINGLE BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN						.456	8		0	1	1
						.456					
SINGLE BLADE PNEUMATIC/DIAPHRAGM/CYLINDER OVER 60 IN						.423	8		0	1	1
						.423					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 251 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	CP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SINGLE BLADE SOLENOID 4 TO 11.99 IN.							16	.578 / .596	0	2	2
PARALLEL BLADE MANUAL 12 TO 19.99 IN							2	.034 / .057	0	1	1
PARALLEL BLADE ELECTRIC MOTOR/SERVO 12 TO 19.99 IN							2	.034 / .057	0	1	1
PARALLEL BLADE ELECTRIC MOTOR/SERVO 20 TO 39.99 IN							6	.109 / .222	0	2	2
PARALLEL BLADE ELECTRIC MOTOR/SERVO 40 TO 59.99 IN							4	.069 / .114	0	1	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
PARALLEL BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.								6	.164	--	0	1	1			
PARALLEL BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN								8	.218	--	0	1	1			
PARALLEL BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 40 TO 59.99 IN								4	.109	--	0	1	1			
NOT CLOSE	6	1	55.00	55.00	55.00	55.00	55.00			212				535	212	24
TOTAL	6	1	55.00	55.00	55.00	55.00	55.00			212				535	212	24
PARALLEL BLADE PNEUMATIC/DIAPHRAGM/CYLINDER OVER 60 IN								2	.055	--	1	1	1			
LEAK	1	1	18.33	18.33	18.33	18.33	18.33			196				196	196	196
TOTAL	1	1	18.33	18.33	18.33	18.33	18.33			196				196	196	196

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80.

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PARALLEL BLADE SOLENOID 2 TO 3.99 IN.						4	.002 .149		0	2	2			
PARALLEL BLADE NONE 20 TO 39.99 IN						1	.057 .057		0	1	1			
OPPOSED BLADE MANUAL 40 TO 59.99 IN						1	.017 .029		0	1	1			
OPPOSED BLADE ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.						2	.037 .054		0	1	1			
OPPOSED BLADE ELECTRIC MOTOR/SERVO 12 TO 19.99 IN						1	.055 .057		0	1	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
OPPOSED BLADE ELECTRIC MOTOR/SERVO 20 TO 39.99 IN								11	.086 .484	0	2	2				
OPPOSED BLADE ELECTRIC MOTOR/SERVO 40 TO 59.99 IN								5	.051 .199	0	2	2				
OPPOSED BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.								14	.119 .640	0	4	3				
OPPOSED BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN								37	.329 2.108	0	4	1				
OPPOSED BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN								23	.329 1.310	0	4	1				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	AVERAGE RESTORATION HOURS	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
OPPOSED BLADE PNEUMATIC/DIAPHRAGM/CYLINDER 40 TO 59.99 IN								4	.110 .228	0		2	1			
PROPORTIONING LOUVER ELECTRIC MOTOR/SERVO UNDEFINED								5	.252 .253	0		3	3			
PROPORTIONING LOUVER PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED								35	1.652 1.663	1		3	3			
OUT OF ADJUSTMENT	1	1	.00	.00	.00	1.37	1.37		96		96	96	96			
TOTAL	1	1	.00	.00	.00	1.37	1.37		96		96	96	96			
ANGLE MANUAL 1/2 TO 1.99 IN.								2	.019 .063	0		1	1			
ANGLE MANUAL 2 TO 3.99 IN.								2	.019 .063	0		1	1			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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ANGLE ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.	13	.396 .550	1	4	4

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T OPEN	1	1	.00	.00	.00	4.56	249	248	248	248
TOTAL	1	1	.00	.00	.00	4.56	249	248	248	248

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ANGLE ELECTRIC MOTOR/SERVO 20 TO 39.99 IN	2	.057 .057	0	1	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ANGLE HYDRAULIC 4 TO 11.99 IN.	8	.073 .294	0	4	4

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ANGLE PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.	1	.044 .044	0	1	1

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ANGLE PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.	7	.195 .299	2	4	3

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T CLOSE	2	1	.00	.00	.00	11.38	13	25	13	0
TOTAL	2	1	.00	.00	.00	11.38	13	25	13	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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ANGLE PNEUMATIC/DIAPHRAGM/CYLINDER 12 TO 19.99 IN								2	.059		0	1	1			
									.071							
ANGLE PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN								2	.048		1	1	1			
									.070							
WON'T CLOSE	1	1	14.26	14.26	14.26	14.26	14.26			3	3	3	3			
TOTAL	1	1	14.26	14.26	14.26	14.26	14.26			3	3	3	3			
ANGLE PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED								1	--		0	1	1			
									.053							
ANGLE SOLENOID 1/2 TO 1.99 IN.								1	.043		1	1	1			
									.057							
WON'T OPEN	1	1	17.56	17.56	17.56	17.56	17.56			336	336	336	336			
TOTAL	1	1	17.56	17.56	17.56	17.56	17.56			336	336	336	336			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ANGLE SOLENOID 4 TO 11.99 IN.			11	.215 .314	9	1	1
ANGLE MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.			86	2.452 3.682	6	16	9
ANGLE MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.			19	.356 .872	7	11	8
ANGLE MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.			75	2.229 3.288	7	9	7

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	.47	20	20	20	20
WON'T HOLD	3	1	.00	.00	.00	.00	44.65	25	33	25	17
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	17.55	87	111	87	63
TOTAL	6	3	.00	.00	.00	.47	44.65	45	111	45	17
LEAK	3	2	.00	.00	.00	.00	22.75	267	736	267	2
WON'T CLOSE	3	2	.00	.00	.00	.00	11.70	9	11	9	5
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	8.78	17	17	17	17
TOTAL	7	4	.00	.00	.00	.00	22.75	121	736	121	2
LEAK	1	1	.00	.00	.00	.00	2.13	34	34	34	34
WON'T CLOSE	2	2	.00	.00	.00	.33	1.45	25	40	25	9
SPURIOUS OPERATION	4	1	.00	.00	.00	.00	3.30	224	224	224	224
TOTAL	7	3	.00	.00	.00	2.13	4.12	140	224	140	9

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ANGLE NONE 2 TO 3.99 IN.								2	--	--	0	1	1			
									.055							
ANGLE NONE 4 TO 11.99 IN.								57	2.329	--	0	3	3			
									3.174							
ANGLE UNDEFINED 4 TO 11.99 IN.								6	.011	--	0	1	1			
									.264							
OTHER MANUAL 1/2 TO 1.99 IN.								39	1.379	--	0	10	7			
									1.685							
OTHER MANUAL 2 TO 3.99 IN.								5	.073	--	0	2	2			
									.264							

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER MANUAL 4 TO 11.99 IN.								15	.206	.706	2	6	4			
										.661						
LEAK	2	1	.00	.00	.00	.00	8.43			744		744	744	744		
TOTAL	2	1	.00	.00	.00	.00	8.43			744		744	744	744		
OTHER ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.								1	.002	.055	0	1	1			
OTHER ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.								4	.083	.121	0	3	3			
OTHER ELECTRIC MOTOR/SERVO 4 TO 11.99 IN.								41	.549	1.852	0	11	7			
OTHER ELECTRIC MOTOR/SERVO 12 TO 19.99 IN								4	.083	.171	0	4	2			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

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NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM	**	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.									3		.016	0	3	3			
											.142						
OTHER PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.									28		.271	4	5	4			
											.992						
LEAK	3	1	.00	.00	.00	.00	4.65				1135		3366	1135		7	
HUNT HOLD	1	1	.00	.00	.00	.00	1.55				2397		2397	2397		2397	
TOTAL	4	1	.00	.00	.00	.00	6.20				1451		3366	1451		7	
OTHER PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.									14		.333	5	5	4			
											.605						
LEAK	6	1	.00	.00	.00	.00	16.63				2209		3744	2208		672	
TOTAL	6	1	.00	.00	.00	.00	16.63				2209		3744	2208		672	
OTHER PNEUMATIC/DIAPHRAGM/CYLINDER 20 TO 39.99 IN									24		1.776	0	2	2			
											1.121						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD.

NPRD REPORT A03 (PART 2) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
REPORT PERIOD: 7/74 -- 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVE>

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER																
PNEUMATIC/DIAPHRAGM/CYLINDER								21		.553	0	2	1			
UNDEFINED										.645						
OTHER																
SOLENOID								5		.085	0	2	1			
UNDER 1/2 IN.										.154						
OTHER																
SOLENOID								5		.248	2	4	4			
2 TO 3.99 IN.										.296						
LEAK	2	1	.00	.00	.00	.00	37.81		254			309	254			198
TOTAL	2	1	.00	.00	.00	.00	37.81		254			309	254			198
OTHER																
SOLENOID								22		.260	0	3	2			
UNDEFINED										.807						
OTHER																
EXPLOSIVE,SQUIB								2		.090	0	1	1			
2 TO 3.99 IN.										.114						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 1/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MINIMUM	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER MECH.(DIFF.PRES.TO O/S FORCE CL) 1/2 TO 1.99 IN.											
COMPONENTS IN CATEGORY: 21								.480	0	8	4
								.556			
OTHER MECH.(DIFF.PRES.TO O/S FORCE CL) 2 TO 3.99 IN.											
COMPONENTS IN CATEGORY: 35								.983	2	18	10
								1.548			
LEAK	2	2	.00	.00	.00	.00	5.07	67	118	67	15
TOTAL	2	2	.00	.00	.00	.00	5.07	67	118	67	15
OTHER MECH.(DIFF.PRES.TO O/S FORCE CL) 4 TO 11.99 IN.											
COMPONENTS IN CATEGORY: 87								1.920	5	12	9
								3.471			
LEAK	1	1	.00	.00	.00	.00	7.61	65	65	65	65
OUT OF LIMITS	4	1	.00	.00	.00	.00	30.43	10	24	10	4
TOTAL	5	1	.00	.00	.00	.00	39.04	21	65	21	4
OTHER MECH.(DIFF.PRES.TO O/S FORCE CL) 20 TO 39.99 IN											
COMPONENTS IN CATEGORY: 7								.088	1	2	2
								.308			
OUT OF ADJUSTMENT	1	1	.00	.00	3.60	7.20	7.20	56	56	56	56
TOTAL	1	1	.00	.00	3.60	7.20	7.20	56	56	56	56

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES										OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER												
MECH.(DIFF.PRES.TO O/S FORCE CL)							20		--	0	1	1
UNDEFINED									.614			
OTHER												
NONE							66		3.250	2	4	4
1/2 TO 1.99 IN.									4.172			
WON'T HOLD	2	1	.00	.00	.00	.53			24	24	24	24
TOTAL	2	1	.00	.00	.00	.53			24	24	24	24
OTHER												
NONE							3		.015	0	1	1
2 TO 3.99 IN.									.166			
OTHER												
NONE							1		--	0	1	1
4 TO 11.99 IN.									.027			
OTHER												
BALL							2		.101	0	1	1
2 TO 3.99 IN.									.106			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER OTHER UNDER 1/2 IN.								.020 .031	1		0	1	1			
OTHER OTHER 1/2 TO 1.99 IN.								.789 .891	17		4	8	5			
LEAK	3	2	.00	.00	.00	3.04	8.42	2880						6168	2880	216
OUT OF LIMITS	1	1	.00	.00	.00	.00	3.04	50						50	50	50
TOTAL	4	2	.00	.00	.00	6.09	8.42	2173						6168	2173	50
OTHER OTHER 2 TO 3.99 IN.								.869 1.129	21		1	9	4			
LEAK	1	1	.00	.00	.00	.00	1.33	16						16	16	16
TOTAL	1	1	.00	.00	.00	.00	1.33	16						16	16	16
OTHER OTHER 4 TO 11.99 IN.								1.029 1.303	21		0	3	3			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
OTHER OTHER 40 TO 59.99 IN	4	--	0	1	1
		.108			
UNDEFINED MANUAL 1/2 TO 1.99 IN.	27	--	0	1	1
		.829			
UNDEFINED MANUAL 2 TO 3.99 IN.	55	.097	0	6	4
		1.742			
UNDEFINED MANUAL 4 TO 11.99 IN.	36	.057	1	6	2
		1.132			
FRACTURE/BREAK	1	.93	78	78	78
TOTAL	1	.93	78	78	78
UNDEFINED MANUAL 20 TO 39.99 IN	4	.069	0	1	1
		.114			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
FRACTURE/BREAK	1	1	.00	.00	.46	.93	.93	78	78	78	78
TOTAL	1	1	.00	.00	.46	.93	.93	78	78	78	78

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AD3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED MANUAL UNDEFINED											
COMPONENTS IN CATEGORY: 6								--	0	1	1
OP/CALENDAR HOURS (MILLIONS): .184											
UNDEFINED ELECTRIC MOTOR/SERVO 1/2 TO 1.99 IN.											
COMPONENTS IN CATEGORY: 2								.047	0	1	1
OP/CALENDAR HOURS (MILLIONS): .110											
UNDEFINED ELECTRIC MOTOR/SERVO 2 TO 3.99 IN.											
COMPONENTS IN CATEGORY: 1								--	0	1	1
OP/CALENDAR HOURS (MILLIONS): .031											
UNDEFINED ELECTRIC MOTOR/SERVO 12 TO 19.99 IN											
COMPONENTS IN CATEGORY: 3								.078	4	2	2
OP/CALENDAR HOURS (MILLIONS): .103											
LEAK	3	1	.00	.00	22.82	45.64	45.64	21	46	21	8
WON'T STOP	1	1	.00	.00	7.60	15.21	15.21	307	307	307	307
TOTAL	4	1	.00	.00	30.43	60.86	60.86	93	307	93	8
UNDEFINED ELECTRIC MOTOR/SERVO 20 TO 39.99 IN											
COMPONENTS IN CATEGORY: 4								.069	0	1	1
OP/CALENDAR HOURS (MILLIONS): .114											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED ELECTRIC MOTOR/SERVO UNDEFINED	2	.034 / .057	0	1	1
UNDEFINED PNEUMATIC/DIAPHRAGM/CYLINDER 1/2 TO 1.99 IN.	9	.261 / .261	0	2	2
UNDEFINED PNEUMATIC/DIAPHRAGM/CYLINDER 2 TO 3.99 IN.	16	.323 / .590	7	6	5

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	8.95	320	320	320	320
CRACK	1	1	.00	.00	.00	4.07	8	8	8	8
PHYSICAL DISTORTION	1	1	.00	.00	.00	8.95	143	143	143	143
WON'T OPEN	3	2	.00	.00	4.07	17.55	59	72	59	32
WON'T HOLD	1	1	.00	.00	.00	8.95	221	221	221	221
TOTAL	7	3	.00	9.14	17.55	26.85	124	320	124	8

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED PNEUMATIC/DIAPHRAGM/CYLINDER 4 TO 11.99 IN.	8	-- / .246	2	2	1

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	4.07	4.07	4.07	4.07	56	56	56	56
FRACTURE/BREAK	1	1	4.07	4.07	4.07	4.07	33	33	33	33
TOTAL	2	1	8.14	8.14	8.14	8.14	45	56	45	33

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED												
PNEUMATIC/DIAPHRAGM/CYLINDER												
UNDEFINED							10		.137	0	3	3
									.399			
UNDEFINED												
SOLENOID												
UNDER 1/2 IN.							24		.847	0	6	1
									1.920			
UNDEFINED												
SOLENOID												
1/2 TO 1.99 IN.							12		--	0	1	1
									.684			
UNDEFINED												
SOLENOID												
4 TO 11.99 IN.							15		.027	0	1	1
									.559			
UNDEFINED												
SOLENOID												
UNDEFINED							25		.140	1	8	2
									1.406			
MOMENT START/MOVE	1	1	.00	.00	.42	.84	.84		1361	1361	1361	1361
TOTAL	1	1	.00	.00	.42	.84	.84		1361	1361	1361	1361

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES			MINIMUM PERCENTILE								OUT-OF-SERVICE HOURS HIGHEST AVERAGE LOWEST	
UNDEFINED												
EXPLOSIVE,SQUIB								2		0	1	1
2 TO 3.99 IN.							.086					
							.114					
UNDEFINED												
MECH.(DIFF.PRES.TO O/S FORCE CL)								5		0	2	2
1/2 TO 1.99 IN.							--					
							.189					
UNDEFINED												
MECH.(DIFF.PRES.TO O/S FORCE CL)								11		0	7	6
2 TO 3.99 IN.							.323					
							.453					
UNDEFINED												
MECH.(DIFF.PRES.TO O/S FORCE CL)								52		2	8	7
4 TO 11.99 IN.							1.610					
							2.643					
LEAK	2	1	.00	.00	.00	8.69	33			49	33	17
TOTAL	2	1	.00	.00	.00	8.69	33			49	33	17
UNDEFINED												
MECH.(DIFF.PRES.TO O/S FORCE CL)								4		0	1	1
12 TO 19.99 IN							--					
							.133					

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVES

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
UNDEFINED UNDEFINED 1/2 TO 1.99 IN.	5	-- .229	0	4	3
UNDEFINED UNDEFINED 2 TO 3.99 IN.	8	.200 .318	1	5	4
UNDEFINED UNDEFINED UNDEFINED	81	.495 2.750	0	6	4

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	7.58	63	63	63	63
TOTAL	1	1	.00	.00	.00	.00	7.58	63	63	63	63

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

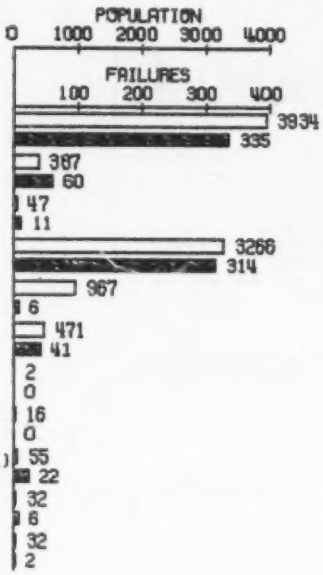
NPRD REPORT R03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

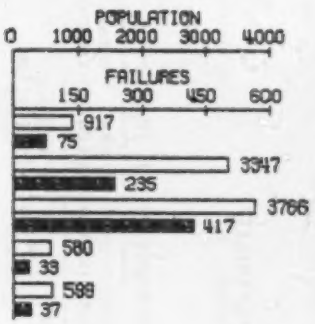
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
VALVE OPERATORS	9209	436.4023	797	8027	350	0

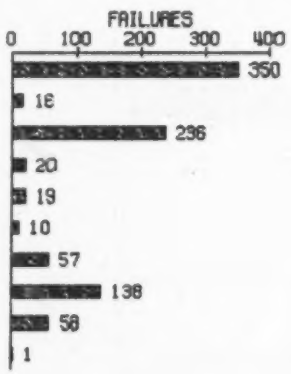
TYPE/CATEGORY



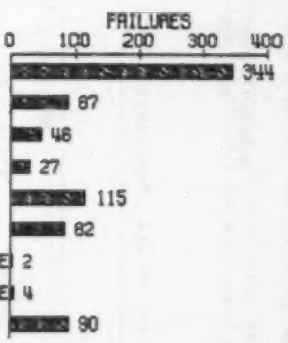
APPLICATION/FUNCTION



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



VALVOP

FAILURES POPULATION

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVE OPERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ELECTRIC MOTOR-AC REVERSE ACTING	79	1.618 4.364	1	11	8

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	5.37	459	459	459	459
TOTAL	1	1	.00	.00	.00	.00	5.37	459	459	459	459

ELECTRIC MOTOR-AC DIRECT ACTING	209	3.629 9.873	11	51	20

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	1.52	18	18	18	18
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.93	107	107	107	107
WON'T START/MOVE	1	1	.00	.00	.00	.00	2.51	81	81	81	81
WON'T CLOSE	4	3	.00	.00	.00	.00	10.14	54	125	54	10
WON'T OPEN	1	1	.00	.00	.00	.00	1.95	24	24	24	24
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	32.57	704	704	704	704
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	.29	54	54	54	54
FALSE RESPONSE	1	1	.00	.00	.00	.00	9.62	30	30	30	30
TOTAL	11	9	.00	.00	.00	.00	32.57	112	704	112	10

ELECTRIC MOTOR-AC DOUBLE ACTING	363	8.972 15.204	18	66	18

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	1.35	2500	2548	2548	2548
PHYSICAL DISPLACEMENT	2	1	.00	.00	.00	.00	2.69	85	85	85	85
FRACTURE/BREAK	1	1	.00	.00	.00	.00	24.18	3	3	3	3
WON'T START/MOVE	5	3	.00	.00	.00	.00	1.84	96	264	96	29
WON'T CLOSE	3	2	.00	.00	.00	.00	.71	453	1056	453	86
WON'T OPEN	3	1	.00	.00	.00	.00	24.03	446	869	446	217
OUT OF ADJUSTMENT	2	1	.00	.00	.00	.00	1.23	378	704	378	51
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.35	41	41	41	41
TOTAL	18	5	.00	.00	.00	1.07	24.18	372	2548	372	3

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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VALVE OPERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ELECTRIC MOTOR-AC GEARED			3216	27.510 144.191	299	391	51
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	5	4	.00	.00	.00	.76	239	1044	239	2
CRACK	3	3	.00	.00	.00	.53	48	64	48	29
PHYSICAL DISTORTION	7	5	.00	.00	.00	.73	760	4594	760	14
PHYSICAL DISPLACEMENT	2	2	.00	.00	.00	.53	242	474	242	9
COLLAPSE	1	1	.00	.00	.00	.27	12	12	12	12
FRACTURE/BREAK	4	3	.00	.00	.00	.53	17	32	17	0
WON'T START/MOVE	61	17	.00	.00	.00	.63	2.53	301	3219	301	0
WON'T STOP	2	2	.00	.00	.00	.00	.40	118	212	118	24
WON'T CLOSE	55	25	.00	.00	.00	.56	8.01	440	6304	440	0
WON'T OPEN	76	23	.00	.00	.00	.74	8.01	231	6081	231	0
WON'T HOLD	4	4	.00	.00	.00	.00	15.22	307	601	307	54
OUT OF LIMITS	20	12	.00	.00	.00	.00	1.14	561	4280	561	6
OUT OF ADJUSTMENT	26	12	.00	.00	.00	.00	1.05	317	3610	317	1
SPURIOUS OPERATION	11	7	.00	.00	.00	.00	.74	303	1720	303	2
FALSE RESPONSE	12	9	.00	.00	.00	.00	.98	74	1448	194	1
OPEN	1	1	.00	.00	.00	.00	.36	320	320	320	320
OTHER (SEE REMARKS)	8	6	.00	.00	.00	.00	.70	101	456	101	0
TOTAL	298	37	.00	.00	1.61	3.15	16.02	319	6304	319	0
ELECTRIC MOTOR-AC PROPORTIONAL			7	.021 .379	1	2	2
FALSE RESPONSE	1	1	.00	.00	1.46	2.93	2.93	3254	3254	3254	3254
TOTAL	1	1	.00	.00	1.46	2.93	2.93	3254	3254	3254	3254

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVE OPERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
ELECTRIC MOTOR-AC PILOT ACTIVATED											
						6		.186	1	3	3
								.239			
WON'T CLOSE	1	1	.00	.00	.00	15.21	15.21	783		783	783	783
TOTAL	1	1	.00	.00	.00	15.21	15.21	783		783	783	783
ELECTRIC MOTOR-AC UNDEFINED											
						54		.081	5	12	8
								2.264			
LEAK	1	1	.00	.00	.00	.00	1.70	25		25	25	25
WON'T START/MOVE	2	2	.00	.00	.00	.00	1.70	22		28	22	15
WON'T OPEN	1	1	.00	.00	.00	.00	1.70	105		105	105	105
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	1.52	30		30	30	30
TOTAL	5	2	.00	.00	.00	.00	5.10	41		105	41	15
ELECTRIC MOTOR-DC REVERSE ACTING											
						9		.099	0	6	5
								.451			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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COMPONENT CLASSIFICATION

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ELECTRIC MOTOR-OC DIRECT ACTING	9	-- / .344	5	5	5

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	5.85	298	298	298	298
FRACTURE/BREAK	1	1	.00	.00	.00	.00	5.85	1015	1015	1015	1015
WON'T START/MOVE	1	1	.00	.00	.00	.00	18.91	59	59	59	59
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	18.91	1	1	1	1
SPURIOUS OPERATION	1	1	.00	.00	.00	.00	5.85	1055	1055	1055	1055
TOTAL	5	2	.00	.00	.00	17.56	37.83	486	1055	486	1

	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
ELECTRIC MOTOR-OC DOUBLE ACTING	2	.072 / .077	1	2	2

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T OPEN	1	1	.00	.00	12.01	24.03	24.03	69	69	69	69
TOTAL	1	1	.00	.00	12.01	24.03	24.03	69	69	69	69

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVE OPERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
									OP/CALENDAR HOURS(MILLIONS) IN CATEGORY		OUT-OF-SERVICE HOURS HIGHEST AVERAGE LOWEST	
ELECTRIC MOTOR-DC GEARED						364		2.030 / 17.392	49	77	25
LEAK	2	2	.00	.00	.00	.00	1.17	137		264 137 9	
CRACK	1	1	.00	.00	.00	.00	1.17	8		8 8 8	
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.85	15		15 15 15	
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.00	.63	249		249 249 249	
FRACTURE/BREAK	3	3	.00	.00	.00	.00	.89	2171		6490 2171 8	
WON'T START/MOVE	13	5	.00	.00	.00	.00	7.89	197		727 197 4	
WON'T CLOSE	8	3	.00	.00	.00	.00	6.01	267		728 357 45	
WON'T OPEN	8	8	.00	.00	.00	.89	9.17	213		1464 213 1	
WON'T HOLD	1	1	.00	.00	.00	.00	.78	3604		3604 3604 3604	
OUT OF LIMITS	4	2	.00	.00	.00	.00	7.61	82		312 82 1	
OUT OF ADJUSTMENT	5	5	.00	.00	.00	.00	7.61	209		678 209 5	
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.52	6		6 6 6	
WON'T OPERATE PER DES	1	1	.00	.00	.00	.00	1.17	32		32 32 32	
TOTAL	49	17	.00	.00	2.19	7.32	15.21	377		6490 392 1	
ELECTRIC MOTOR-DC PILOT ACTIVATED						1		.026 / .039	1	1	1
LEAK	1	1	25.58	25.58	25.58	25.58	25.58	81		81 81 81	
TOTAL	1	1	25.58	25.58	25.58	25.58	25.58	81		81 81 81	
ELECTRIC MOTOR-DC UNDEFINED						3		.090 / .167	4	3	2
PHYSICAL DISTORTION	1	1	.00	.00	8.77	17.55	17.55	536		536 536 536	
WON'T OPEN	1	1	.00	.00	8.77	17.55	17.55	115		115 115 115	
OUT OF LIMITS	2	1	.00	.00	9.12	18.25	18.25	10		16 10 3	
TOTAL	4	2	18.25	18.25	26.57	35.10	35.10	168		536 168 3	

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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VALVE OPERATORS

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COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
HYDRAULIC REVERSE ACTING			4	.047	0	2	2
				.190			
HYDRAULIC DIRECT ACTING			16	.156	7	6	5
				.760			
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	1	1	.00	.00	.00	.00	10.10	125	125	125	125
FRACTURE/BREAK	1	1	.00	.00	.00	.00	8.78	99	99	99	99
WON'T START/MOVE	2	2	.00	.00	.00	3.09	10.10	76	144	76	7
WON'T CLOSE	3	2	.00	.00	.00	5.85	6.19	487	1381	487	5
TOTAL	7	4	.00	5.85	8.78	9.28	20.21	262	1381	262	5
HYDRAULIC DOUBLE ACTING			2	--	1	1	1
				.013			
WON'T OPERATE PER DEM	1	1	74.47	74.47	74.47	74.47	74.47	44	44	44	44
TOTAL	1	1	74.47	74.47	74.47	74.47	74.47	44	44	44	44
HYDRAULIC GEARED			8	.328	1	2	2
				.447			
OUT OF LIMITS	1	1	.00	.00	2.19	4.39	4.39	0	0	0	0
TOTAL	1	1	.00	.00	2.19	4.39	4.39	0	0	0	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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VALVE OPERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM		MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)				
									OUT-OF-SERVICE HOURS		
									HIGHEST	AVERAGE	LOWEST
HYDRAULIC PROPORTIONAL						2	-- / .114	--	0	1	1
HYDRAULIC PILOT ACTIVATED						15	.798 / .854	2	5		3
WON'T CLOSE	1	1	.00	.00	.00	2.19	2.19	13	13	13	13
WON'T OPEN	1	1	.00	.00	.00	2.93	2.93	6	6	6	6
TOTAL	2	2	.00	.00	2.19	2.93	2.93	10	13	10	6
PNEUMATIC/DIAPHRAGM/CYLINDER REVERSE ACTING						1016	23.973 / 49.685	83	194		43
LEAK	10	9	.00	.00	.00	.00	3.29	923	5000	923	6
CRACK	1	1	.00	.00	.00	.00	.32	2883	2883	2883	2883
BREACH	1	1	.00	.00	.00	.00	3.51	5	5	5	5
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.52	3	3	3	3
PHYSICAL DISPLACEMENT	3	1	.00	.00	.00	.00	.96	11	29	11	1
WON'T START/MOVE	4	4	.00	.00	.00	.00	24.03	61	206	61	4
WON'T CLOSE	13	6	.00	.00	.00	.00	3.44	117	744	117	0
WON'T OPEN	29	7	.00	.00	.00	.00	9.60	482	1095	482	4
WON'T HOLD	2	1	.00	.00	.00	.00	3.44	43	76	43	9
OUT OF LIMITS	6	3	.00	.00	.00	.00	1.90	860	1704	860	2
OUT OF ADJUSTMENT	4	3	.00	.00	.00	.00	3.44	139	319	139	31
SPURIOUS OPERATION	7	3	.00	.00	.00	.00	1.64	97	175	97	24
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.72	56	56	56	56
OTHER (SEE REMARKS)	1	1	.00	.00	.00	.00	.54	871	871	871	871
TOTAL	83	19	.00	.00	.00	1.46	24.03	425	5000	425	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

VALVE OPERATORS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
PNEUMATIC/DIAPHRAGM/CYLINDER DIRECT ACTING	1251	27.626 / 60.921	134	229	48

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	21	11	.00	.00	.00	3.46	849	3421	849	1
BREACH	2	2	.00	.00	.00	2.24	105	152	105	58
PHYSICAL DISTORTION	5	3	.00	.00	.00	2.19	120	239	120	54
PHYSICAL DISPLACEMENT	1	1	.00	.00	.00	.53	5	5	5	5
FRACTURE/BREAK	9	5	.00	.00	.00	2.37	65	148	65	1
WON'T START/MOVE	9	7	.00	.00	.00	6.58	65	368	65	2
WON'T CLOSE	29	12	.00	.00	.00	4.73	142	2376	142	0
WON'T OPEN	17	11	.00	.00	.00	3.46	158	999	158	5
WON'T HOLD	1	1	.00	.00	.00	.72	7	7	7	7
OUT OF LIMITS	14	4	.00	.00	.00	6.08	203	1170	203	2
OUT OF ADJUSTMENT	10	10	.00	.00	.00	2.37	44	106	44	4
SPURIOUS OPERATION	11	6	.00	.00	.00	2.62	289	1421	289	5
FALSE RESPONSE	5	3	.00	.00	.00	2.10	242	453	242	4
TOTAL	134	24	.00	.00	.00	19.75	256	3421	256	0

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
PNEUMATIC/DIAPHRAGM/CYLINDER DOUBLE ACTING	538	11.587 / 26.623	35	54	26

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	6	6	.00	.00	.00	3.51	124	512	124	1
PHYSICAL DISTORTION	1	1	.00	.00	.00	.97	4	4	4	4
FRACTURE/BREAK	1	1	.00	.00	.00	1.76	7	7	7	7
WON'T START/MOVE	2	1	.00	.00	.00	4.39	8	8	8	8
WON'T CLOSE	11	5	.00	.00	.00	8.78	102	696	102	0
WON'T OPEN	8	6	.00	.00	.00	7.02	304	2136	304	2
OUT OF LIMITS	1	1	.00	.00	.00	1.69	8	8	8	8
SPURIOUS OPERATION	3	3	.00	.00	.00	3.65	28	47	28	16
OTHER (SEE REMARKS)	2	2	.00	.00	.00	1.59	460	909	460	10
TOTAL	35	9	.00	.00	.00	19.75	152	2136	152	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT A03 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
PNEUMATIC/DIAPHRAGM/CYLINDER GEARED	10	.374 1.826	0	5	5
PNEUMATIC/DIAPHRAGM/CYLINDER PROPORTIONAL	98	3.992 5.068	14	14	12
PNEUMATIC/DIAPHRAGM/CYLINDER PILOT ACTIVATED	157	3.211 7.709	13	26	16

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
WON'T START/MOVE	1	1	.00	.00	.00	.00	.40	28	28	28	28
WON'T CLOSE	2	1	.00	.00	.00	.00	.80	74	74	74	73
WON'T OPEN	8	1	.00	.00	.00	.00	3.19	675	4014	675	2
WON'T HOLD	1	1	.00	.00	.00	.00	9.46	4	4	4	4
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	.80	47	93	47	1
TOTAL	14	2	.00	.00	.00	.00	9.46	405	4014	405	1
LEAK	2	2	.00	.00	.00	.00	2.20	32	54	32	10
WON'T CLOSE	2	1	.00	.00	.00	.00	6.09	4	4	4	4
WON'T OPEN	4	1	.00	.00	.00	.00	5.78	522	1972	522	8
OUT OF LIMITS	1	1	.00	.00	.00	.00	2.20	24	24	24	24
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	1.25	0	0	0	0
SPURIOUS OPERATION	2	2	.00	.00	.00	.00	4.39	161	289	161	32
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.45	10	10	10	10
TOTAL	13	6	.00	.00	.00	.00	7.23	193	1972	193	0

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
PNEUMATIC/DIAPHRAGM/CYLINDER OTHER									8	.277	5	3	2
										.417			
WON'T START/MOVE	4	1	.00	.00	6.30	12.61	12.61	73					
WON'T CLOSE	1	1	.00	.00	1.57	3.15	3.15	73					
TOTAL	5	1	.00	.00	7.88	15.76	15.76	73					
PNEUMATIC/DIAPHRAGM/CYLINDER UNDEFINED									188	.059	30	31	8
										9.398			
LEAK	5	3	.00	.00	.00	.00	4.52	614					
FRACTURE/BREAK	1	1	.00	.00	.00	.00	.94	54					
WON'T START/MOVE	3	2	.00	.00	.00	.00	1.80	10					
WON'T STOP	1	1	.00	.00	.00	.00	.94	90					
WON'T CLOSE	2	2	.00	.00	.00	.00	1.51	322					
WON'T OPEN	12	3	.00	.00	.00	.00	8.10	24					
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	.94	8					
SPURIOUS OPERATION	2	1	.00	.00	.00	.00	1.89	48					
FALSE RESPONSE	2	1	.00	.00	.00	.00	1.89	37					
WON'T RESPOND	1	1	.00	.00	.00	.00	.90	72					
TOTAL	30	4	.00	.00	.00	.00	11.70	148					
SOLENOID-AC REVERSE ACTING									13	.005	0	2	2
										.651			

OUT-OF-SERVICE HOURS	HIGHEST	AVERAGE	LOWEST
TOTAL	1588	614	41
WON'T START/MOVE	73	73	73
WON'T CLOSE	73	73	73
TOTAL	73	73	73
LEAK	1588	614	41
FRACTURE/BREAK	54	54	54
WON'T START/MOVE	18	10	4
WON'T STOP	90	90	90
WON'T CLOSE	604	322	39
WON'T OPEN	120	24	2
OUT OF ADJUSTMENT	8	8	8
SPURIOUS OPERATION	51	48	44
FALSE RESPONSE	48	37	26
WON'T RESPOND	72	72	72
TOTAL	1588	148	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
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ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY / AVERAGE RESTORATION HOURS	OP/CALENDAR HOURS(MILLIONS) / TOTAL FAILURES	NUMBER OF SYSTEMS / OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	NUMBER OF UNITS / LOWEST
SOLENOID-AC DIRECT ACTING								44	.786	1	10	9
									1.713			
WON'T START/MOVE	1	1	.00	.00	.00	.00	8.45	122		122	122	122
TOTAL	1	1	.00	.00	.00	.00	8.45	122		122	122	122
SOLENOID-AC DOUBLE ACTING								137	3.225	3	9	8
									5.665			
WON'T OPEN	2	1	.00	.00	.00	.00	2.54	7		7	7	7
FALSE RESPONSE	1	1	.00	.00	.00	.00	1.27	11		11	11	11
TOTAL	3	1	.00	.00	.00	.00	3.81	8		11	8	7
SOLENOID-AC GEARED								1	--	0	1	1
									.050			
SOLENOID-AC PROPORTIONAL								3	.001	0	1	1
									.081			

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	UP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SOLENOID-AC																
PILOT ACTIVATED									725	11.780	1	7	6			
										41.224						
LEAK	1	1	.00	.00	.00	.00	7.61	4222						4222	4222	4222
TOTAL	1	1	.00	.00	.00	.00	7.61	4222						4222	4222	4222
SOLENOID-AC																
OTHER									1	.066	1	1	1			
										.066						
WON'T CLOSE	1	1	15.22	15.22	15.22	15.22	15.22	22						22	22	22
TOTAL	1	1	15.22	15.22	15.22	15.22	15.22	22						22	22	22
SOLENOID-AC																
UNDEFINED									43	1.279	0	5	5			
										1.887						
SOLENOID-DC																
REVERSE ACTING									23	.542	0	7	6			
										.835						

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE MINIMUM	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
SOLENOID-DC DIRECT ACTING					336		6.722			
							14.574			
								32	35	13
CRACK	1	1	.00	.00	.00	.00	29.77	195	195	195
PHYSICAL DISTORTION	1	1	.00	.00	.00	.00	.30	149	149	149
WON'T START/MOVE	2	1	.00	.00	.00	.00	.59	638	795	638
WON'T CLOSE	3	3	.00	.00	.00	.00	19.56	212	629	212
WON'T OPEN	2	1	.00	.00	.00	.00	.59	19	23	19
WON'T HOLD	15	1	.00	.00	.00	.00	4.46	566	8027	566
OUT OF LIMITS	1	1	.00	.00	.00	.00	.30	74	74	74
OUT OF ADJUSTMENT	4	1	.00	.00	.00	.00	1.19	734	1692	734
SPURIOUS OPERATION	3	1	.00	.00	.00	.00	.89	2879	7351	2879
TOTAL	32	5	.00	.00	.00	.53	29.77	701	8027	701
SOLENOID-DC DOUBLE ACTING					4		.161			
							.182			
								1	3	3
CRACK	1	1	.00	.00	.00	32.60	32.60	80	80	80
TOTAL	1	1	.00	.00	.00	32.60	32.60	80	80	80
SOLENOID-DC GEARED					4		.027			
							.120			
								0	2	2

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS	OUT-OF-SERVICE HOURS HIGHEST	OUT-OF-SERVICE HOURS AVERAGE	OUT-OF-SERVICE HOURS LOWEST
SOLENOID-DC PILOT ACTIVATED								30	.693		4	8	4			
									1.103							
WON'T OPEN	3	1	.00	.00	.00	.00	7.61			23				35	23	9
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	12.01			45				45	45	45
TOTAL	4	2	.00	.00	.00	3.80	12.01			29				45	29	9
SOLENOID-DC OTHER								1	.031		0	1	1			
									.051							
SOLENOID-DC UNDEFINED								73	1.311		4	15	5			
									3.521							
WON'T OPEN	4	3	.00	.00	1.34	2.53	3.33			65				216	65	7
TOTAL	4	3	.00	.00	1.34	2.53	3.33			65				216	65	7
FLOAT DOUBLE ACTING								2	.110		0	1	1			
									.114							

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION / FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	AVERAGE RESTORATION HOURS	TOTAL FAILURES	NUMBER OF SYSTEMS OUT-OF-SERVICE HIGHEST	NUMBER OF SYSTEMS OUT-OF-SERVICE AVERAGE	NUMBER OF UNITS HOURS LOWEST
EXPLOSIVE,SQUIB DIRECT ACTING								10	.176	.510	0	5		5
EXPLOSIVE,SQUIB PILOT ACTIVATED								4	--	.219	0	2		2
EXPLOSIVE,SQUIB OTHER								2	--	.114	0	1		1
MECH.(DIFF.PRES.TO O/S FORCE CL) REVERSE ACTING								1	.012	.031	2	1		1
LEAK	2	1	65.20	65.20	65.20	65.20	65.20				4	7	4	1
TOTAL	2	1	65.20	65.20	65.20	65.20	65.20				4	7	4	1

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM **	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
MECH.(DIFF.PRES.TO O/S FORCE CL) DIRECT ACTING			11		.334	9	4		2
					.612				
LEAK	8	2	10.10	10.10	11.88	13.66	13.66	1769	6312	1769	0
WON'T OPEN	1	1	.00	.00	.97	1.95	1.95	4	4	4	4
TOTAL	9	2	10.10	10.10	12.85	15.61	15.61	1573	6312	1573	0
MECH.(DIFF.PRES.TO O/S FORCE CL) DOUBLE ACTING			24		.468	0	1		1
					.684				
MECH.(DIFF.PRES.TO O/S FORCE CL) GEARED			1		.036	1	1		1
					.039				
WON'T OPEN	1	1	25.53	25.53	25.53	25.53	25.53	4	4	4	4
TOTAL	1	1	25.53	25.53	25.53	25.53	25.53	4	4	4	4
MECH.(DIFF.PRES.TO O/S FORCE CL) PROPORTIONAL			4		--	0	1		1
					.114				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
			14	--	10	2	2
MECH.(DIFF.PRES.TO O/S FORCE CL) PILOT ACTIVATED				.797			

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
LEAK	8	1	.00	.00	8.78	17.56	17.56	1918	7283	1918	29
WON'T OPEN	1	1	.00	.00	1.10	2.20	2.20	18	18	18	18
OUT OF LIMITS	1	1	.00	.00	1.10	2.20	2.20	8	8	8	8
TOTAL	10	1	.00	.00	10.97	21.95	21.95	1537	7283	1537	8

OTHER REVERSE ACTING						9	.381	0	2	2
							.390				
OTHER DIRECT ACTING						17	.223	6	5	4
							.749				
WON'T START/MOVE	1	1	.00	.00	.00	.00	3.15	434	434	434	434
WON'T STOP	1	1	.00	.00	.00	.00	3.15	2	2	2	2
WON'T CLOSE	1	1	.00	.00	.00	.00	3.15	486	486	486	486
WON'T OPEN	2	1	.00	.00	.00	.00	6.30	121	194	121	48
OUT OF ADJUSTMENT	1	1	.00	.00	.00	.00	10.10	555	555	555	555
TOTAL	6	2	.00	.00	.00	5.05	15.76	287	555	287	2
OTHER DOUBLE ACTING						2	.083	0	2	2
							.086				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

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THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS * 25 TH MINIMUM PERCENTILE / MEDIAN / 75 TH PERCENTILE / ** MAXIMUM	AVERAGE RESTORATION HOURS		OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
OTHER GEARED			4	--	0	1		1
				.070				
UNDEFINED DIRECT ACTING			3	.061	0	2		2
				.122				
UNDEFINED GEARED			1	.031	0	1		1
				.031				
UNDEFINED PILOT ACTIVATED			1	.046	0	1		1
				.055				
UNDEFINED OTHER			1	.030	0	1		1
				.050				

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

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COMPONENT CLASSIFICATION

				FAILURES PER MILLION CALENDAR HOURS									
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
												OUT-OF-SERVICE HOURS HIGHEST	AVERAGE LOWEST
UNDEFINED													
UNDEFINED									26	.128	2	4	3
										.881			
WON'T START/MOVE	1	1	.00	.00	.00	1.48	1.48	200					
OUT OF LIMITS	1	1	.00	.00	.00	6.34	6.34	19					
TOTAL	2	2	.00	.00	1.48	6.34	6.34	110					
												200	19
												19	19
												110	19

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

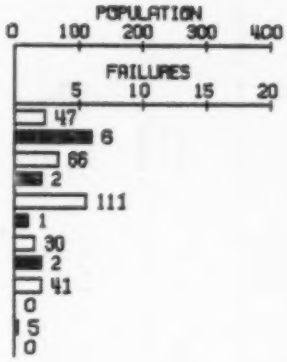
NPRD REPORT A03 (PART 1) ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY

PERIOD: 7/74 - 12/80 NUCLEAR PLANT RELIABILITY DATA SYSTEM

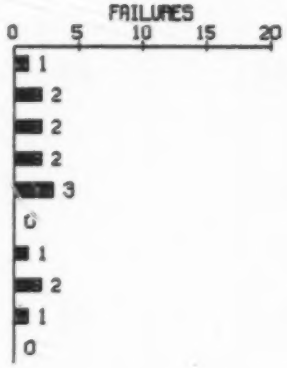
THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 7/1/74 THRU 12/31/80

COMPONENT CLASSIFICATION ALL FAILURE MODES	COMP IN CATEGORY	CALENDAR HOURS(MIL)	NUMBER OF FAILURES	OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
PRESSURE VESSELS	300	12.6460	11	1036	359	19

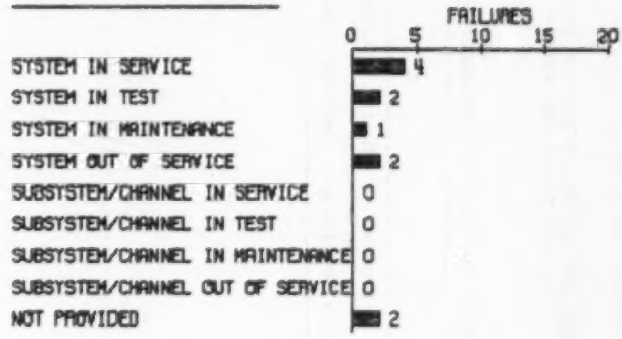
TYPE/CATEGORY



FAILURE DETECTION METHOD



STATUS AT TIME OF FAILURE



VESSEL

FAILURES POPULATION

NPRD REPORT A03 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PRESSURE VESSELS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION			FAILURES PER MILLION CALENDAR HOURS						COMPONENTS IN CATEGORY	OP/CALENDAR HOURS(MILLIONS)	TOTAL FAILURES	NUMBER OF SYSTEMS	NUMBER OF UNITS
FAILURE MODES	NO. FAILURES	NO. UNITS	* MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	MAXIMUM	** AVERAGE RESTORATION HOURS				OUT-OF-SERVICE HOURS HIGHEST	AVERAGE	LOWEST
REACTOR VESSEL									47	2.024	6	43		43
										2.210				
LEAK	6	4	.00	.00	.00	.00	37.84	358				1036	358	105
TOTAL	6	4	.00	.00	.00	.00	37.84	358				1036	358	105
PRESSURIZER VESSEL									66	2.499	2	45		38
										2.865				
LEAK	2	1	.00	.00	.00	.00	35.10	19				19	19	19
TOTAL	2	1	.00	.00	.00	.00	35.10	19				19	19	19
CONTAINMENT/DRYWELL									111	3.761	1	32		17
										4.066				
LEAK	1	1	.00	.00	.00	.00	19.01	302				302	302	302
TOTAL	1	1	.00	.00	.00	.00	19.01	302				302	302	302
PRESSURE SUPPRESSION									30	1.089	2	13		11
										1.316				
LEAK	1	1	.00	.00	.00	.00	8.30	560				560	560	560
CRACK	1	1	.00	.00	.00	.00	17.56	899				899	899	899
TOTAL	2	2	.00	.00	.00	.00	17.56	730				899	730	560

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

NPRD REPORT AU3 (PART 2)
REPORT PERIOD: 7/74 -- 12/80

ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY
NUCLEAR PLANT RELIABILITY DATA SYSTEM

PRESSURE VESSELS

THIS REPORT CONTAINS STATISTICS ON ALL COMPONENTS IN THE NPRDS ACCUMULATED BETWEEN 07/01/74 AND 12/31/80

COMPONENT CLASSIFICATION

COMPONENTS IN CATEGORY: 41
OP/CALENDAR HOURS(MILLIONS): 1.374 / 1.909
TOTAL FAILURES: 0
NUMBER OF SYSTEMS: 15
NUMBER OF UNITS: 8

FAILURE MODES	NO. FAILURES	NO. UNITS	FAILURES PER MILLION CALENDAR HOURS: * MINIMUM	25 TH PERCENTILE	MEDIAN	75 TH PERCENTILE	** MAXIMUM	AVERAGE RESTORATION HOURS	OUT-OF-SERVICE HOURS: HIGHEST	AVERAGE	LOWEST
OTHER											

* LOWEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT
** HIGHEST CALCULATED FAILURE RATE FROM AN INDIVIDUAL UNIT

PLEASE REFER TO PAGE 261 FOR DESCRIPTION OF CALCULATION METHOD

APPENDIX A

DEFINITIONS OF NPRD ANNUAL REPORT ELEMENTS

APPENDIX A

DEFINITIONS OF NPRD ANNUAL REPORT ELEMENTS

The following definitions apply specifically to the included A02 and A03 reports. For the "Annual Report of Cumulative System Reliability" (NPRD Report A02), the definitions apply to all reporting units in computing the Annual Report elements. The "Annual Report of Cumulative Component Reliability" (NPRD Report A03) provides the nuclear industry with statistics on all components included in the NPRD data base.

DEFINITIONS OF NPRD REPORT A02 ELEMENTS — "ANNUAL REPORT OF CUMULATIVE SYSTEMS RELIABILITY"

(1) SYSTEM TITLE

Specific system titles are reported along with the associated type of unit, i.e., GE, B&W, CE, WEST, under the broad generic system classifications appearing in Table 1 of the NPRD System Reporting Procedures Manual. For example, the first generic system title listed is "Air Conditioning, Heating, Cooling and Ventilation System and Control." In this particular case, the eight specific systems reported represent different applications of ventilation equipment appearing in the NPRD System data base which fall within the Standard Generic Code AAX.

(2) TYPE OF UNIT

Abbreviation of Nuclear Steam System Supplier (NSSS) — General Electric (GE), Babcock and Wilcox (B&W), Combustion Engineering (CE), Westinghouse (WEST).

(3) SYSTEMS

The total population of specific systems supplied by the same NSSS supplier on which reliability data are being reported.

(4) OPERATING HOURS (× 1000)

The cumulative operating hours for the systems for the three reactor conditions in the reporting period. This is the sum of the product of the "Reactor Critical (hr)" multiplied by the corresponding ". . .Percent of Reactor Critical Hours" plus the product of the "Standby Condition (hr)" multiplied by the corresponding ". . .Percent of Standby Condition Hours" plus the product of the "Reactor Shutdown (hr)" multiplied by the corresponding ". . .Percent of Reactor Shutdown Hours" as reported by the operating units in the Quarterly Operating Reports and Report of Engineering Data, respectively, for each generic type of system. This sum is then divided by one hundred thousand (one thousand × 100 percent).

Example:

Reactor Critical hours	=	6214
Standby Condition hours	=	195
Reactor Shutdown hours	=	1751
Percent of Reactor Critical hours	=	100.00
Percent of Standby Condition hours	=	100.00
Percent of Reactor Shutdown hours	=	000.00

$$\text{Operating hours } (\times 1000) = \frac{6214 \times 100.00 + 195 \times 100.00 + 1751 \times 000.00}{100{,}000} = 6.409$$

(5) CALENDAR HOURS (× 1000)

The cumulative calendar hours for the systems for the reporting period. This is the elapsed time in the reporting period from the data start date as reported on the Report of Engineering Data Forms.

(6) TESTS

The total number of systems tests for the period. Input data are obtained from the System Report of Engineering Data which contains the estimated testing frequency and interval for check, functional, and calibration tests as submitted by the Utility on Report of Engineering Data form.

(7) FAIL (SYSTEM)

The number of failures which caused the effect "loss of system function," as submitted by the Utility on Report of Failure forms.

(8) FAILURES PER MILLION CALENDAR HOURS

These figures are calculated by taking the ratio of the number of failures to calendar hours, for each system type in the table. This ratio is then multiplied by one million.

Example:

number of failures	=	3
calendar hours	=	394,300
Failures per million calendar hours	=	$\frac{3}{394{,}300} \times 1{,}000{,}000 = 7.61$

(9) RESTORATION HOURS (COMPONENT)

The hours to restore the component back to service following failure detection. These figures are calculated from the data included in the Report of Failure submitted by the Utility.

(10) OUT-OF-SERVICE HOURS (AVG)

The average hours that the systems are out of service due to system or component failure. These figures are calculated from data included on Reports of Failure submitted by the Utility.

(11) FAIL (COMPONENT)

The number of component failures in the system except those which caused the loss of system function, as reported by the Utility on Report of Failure forms.

(12) MAJOR COMPONENT TYPES AFFECTING XXX SYSTEMS

The generic description, subcategory, or type designation which best describes the function of the component in the system as reported by the Utility on Report of Engineering Data forms.

(13) OPERATING HOURS/CALENDAR HOURS

The ratio of operating hours to calendar hours of like components in the generic systems reported by the Utilities on the Report of Engineering Data and Quarterly Operating Report forms. These figures are calculated by dividing the operating hours by the calendar hours.

(14) FAILURE (MAJOR COMPONENT TYPES AFFECTING XXX SYSTEM)

The number of failures which caused an effect on the system as reported by the operating units in the Report of Failure form, for each combined generic component class.

(15) NON-PEDIGREE COMPONENTS

A description for combining into a single category electrical conductors (ELECON); pipes, fittings (PIPEXX); and shock suppressors and supports (SUPORT). The population of components in these categories may be incomplete because of the extensive effort required to develop engineering data; and the Report of Engineering Data form (Report form NPRD-2) need not be submitted on a given PIPEXX, ELECON, or SUPORT until the first Report of Failure form (Report form NPRD-4) is submitted for that component.

(16) COMPONENT FAILURES PER MILLION CALENDAR HOURS

The calculated failure frequency (expressed in failures per million calendar hours) over all failure modes and across all operating units for the population of components in the system reported by the operating units in the Report of Failure, Report of Engineering Data, and Quarterly Report, for each combined generic component class. These figures are calculated by taking the ratio of the number of failures to calendar hours for each combined class of components in the system in the table. This ratio is then multiplied by one million.

Example:

$$\text{Number of failures} = 6$$
$$\text{Calendar hours} = 124{,}352$$

$$\text{Component failures per million calendar hours} = \frac{6}{124{,}352} \times 1{,}000{,}000 = 48.25$$

(17) OUT-OF-SERVICE HOURS FOR COMPONENTS

The range of out-of service hours submitted by the operating units on Report of Failure forms, for each combined class of components. The out-of-service is calculated from the "Failure Event Start" and "Failure Event End" data entries on the forms, and the range is selected based on the highest and lowest values calculated for each component. The average out-of-service hours (*) is calculated by dividing the sum of the individual out-of-service hours reported on each component in the category by the number of failures.

(18) RESTORATION HOURS FOR COMPONENTS

The range of restoration hours for like components reported by the Utility on Report of Failure forms. The restoration hours are calculated from the "Date of Discovery" and "Failure Event End" data entries on the forms, and the range is selected based on the highest and lowest values calculated for each component. The average restoration hours (□) are calculated by dividing the sum of the individual restoration hours reported on each component in the category by the number of failures.

DEFINITIONS OF NPRD REPORT A03 ELEMENTS— "ANNUAL REPORT OF CUMULATIVE COMPONENT RELIABILITY"

(1) COMPONENT CLASSIFICATION

Type of nuclear plant component from NPRD System Reporting Procedures Manual, Table 2.

(2) COMPONENTS IN CATEGORY

The number of nuclear plant components on which statistics are presented is listed in this column.

(3) CALENDAR HOURS (MILLION)

The cumulative calendar hours for the component for the reporting period.

(4) NUMBER OF FAILURES

The number of failures reported by the operating units on Report of Failure forms, for each component category.

(5) OUT-OF-SERVICE HOURS

The out-of-service hours reported by operating units on Report of Failure forms, for each different grouping of components in the data base. The out-of-service hours are calculated from the "Failure Event Start" and "Failure Event End" data entries on the form. The highest and lowest values are shown in the tables. The average value is also shown, and it is determined by taking the ratio of the sum of the out-of-service hours to the number of reported failure, for each of the different component categories.

(6) TYPE/CATEGORY

The type or category of components from NPRDS Reporting Procedures Manual Table 3 as reported by the Utilities in Report of Engineering Data forms and in Report of Failure forms.

(7) APPLICATION/FUNCTION

The application or function of components from NPRDS Reporting Procedures Manual Table 3 as reported by the Utility in Report of Engineering data forms and in Report of Failure forms.

(8) FAILURE DETECTION METHOD

The method with which the failure was detected, as reported by the Utility on Report of Failure form.

(9) STATUS AT TIME OF FAILURE

The status at time failure was discovered, as reported by the Utility on Report of Failure form.

(10) OPERATING/CALENDAR HOURS (MILLION)

The number of operating hours over the calendar hours. The operating hours for the component are for the three reactor conditions in the reporting period. This is the sum of the "Reactor Critical Hours," "Shutdown Hours," and "Standby Hours," on the Quarterly Operating Report multiplied by the corresponding "Percent of Critical; Standby; Shutdown Hours" as reported on Report of Engineering Data forms. The calendar hours are for the component for the reporting period. This is the elapsed time in the reporting period from the data start date as reported on the Report of Engineering Data form.

(11) NUMBER OF SYSTEMS

The total number of systems reported for the component in the subcategory listed in the Report of Engineering Data forms.

(12) NUMBER OF UNITS

The total number of units reporting engineering data for the component in the subcategory listed in Report of Engineering Data forms.

(13) NUMBER FAILURES (MODE)

The total reported failures in the failure mode of the corresponding component subcategory.

(14) NUMBER OF UNITS (MODE)

The total number of units reporting the failure mode for the component in the subcategory listed in the Report of Failure form.

(15) FAILURES PER MILLION CALENDAR HOURS

These figures are calculated by taking the ratio of the number of failures reported by the operating units on Report of Failure forms to the calendar hours, for each component category. This ratio is then multiplied by one million.

Example:

$$\text{Number of failures} = 12$$
$$\text{Calendar hours} = 5{,}572{,}554$$
$$\text{Failures per million calendar hours} = \frac{12}{5{,}572{,}554} \times 1{,}000{,}000 = 2.15$$

(a) Minimum — The minimum calculated value of failure rate for the component type reported by a Utility to the data base.

(b) Maximum — The maximum calculated value of failure rate for the component type reported by a Utility to the data base.

(c) Percentiles — 25th, 50th (MEDIAN), and 75th.

The 25, 50 (Median), and 75th percentile values are determined by rearranging the calculated failure rates from the lowest to the highest values. Then, for a given ordered population size (m), the estimates to determine the percentiles are found in the following table. The estimates follow a cyclic pattern of 4, 2, 4 for 25th, 50th, and 75th percentile value, respectively. Estimates cover population sizes ranging from 1 to 16. For larger population sizes (m>16) than shown in the table, the estimates can be determined by extending the table to the population size of interest using the appropriate cyclic pattern.

Excerpted from:

TABLE 3. ESTIMATES OF MINIMUM, $\lambda(0.25)$, MEDIAN, $\lambda(0.75)$, AND MAXIMUM USING THE EQUATIONS IN TABLE 4

m	MINIMUM	$\lambda(0.25)$	MEDIAN	$\lambda(0.75)$	MAXIMUM
1	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[1]}$
2	$\lambda_{[1]}$	$\lambda_{[1]}$	$1/2(\lambda_{[1]} + \lambda_{[2]})$	$\lambda_{[2]}$	$\lambda_{[2]}$
3	$\lambda_{[1]}$	$\lambda_{[1]}$	$\lambda_{[2]}$	$\lambda_{[3]}$	$\lambda_{[3]}$
4	$\lambda_{[1]}$	$1/2(\lambda_{[1]} + \lambda_{[2]})$	$1/2(\lambda_{[2]} + \lambda_{[3]})$	$1/2(\lambda_{[3]} + \lambda_{[4]})$	$\lambda_{[4]}$
5	$\lambda_{[1]}$	$\lambda_{[2]}$	$\lambda_{[3]}$	$\lambda_{[4]}$	$\lambda_{[5]}$
6	$\lambda_{[1]}$	$\lambda_{[2]}$	$1/2(\lambda_{[3]} + \lambda_{[4]})$	$\lambda_{[5]}$	$\lambda_{[6]}$

Example:

Failure Rates, ordered	=	0, 0, 0, 14.81, 20.65, 51.81
Population Size (m)	=	6
MINIMUM $\lambda[1]$	=	0
25th percentile $\lambda(0.25)$	=	$\lambda[2] = 0$
50th percentile (Median)	=	$1/2(\lambda_{[3]} + \lambda_{[4]} = 1/2(0 + 14.81) = 7.405$
75th percentile $\lambda(0.75)$	=	$\lambda_{[5]} = 20.65$
MAXIMUM	=	51.81

(16) AVERAGE RESTORATION HOURS

The hours to restore the component back to service following failure detection. The figures as calculated from the data included in the Report of Failure forms submitted by the Utilities. The average is calculated by dividing the sum of the individual restoration hours reported on each component in the subcategory by the number of failures reported.

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16. ABSTRACT (200 words or less)

This NPRDS document includes two annual reports:
(1) Annual Report of Cumulative System Reliability (A02)
(2) Annual Report of Cumulative Component Reliability (A03)

Both annual reports provide generic reliability information on systems and components for the cumulative period from July 1974 through December 1982.

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